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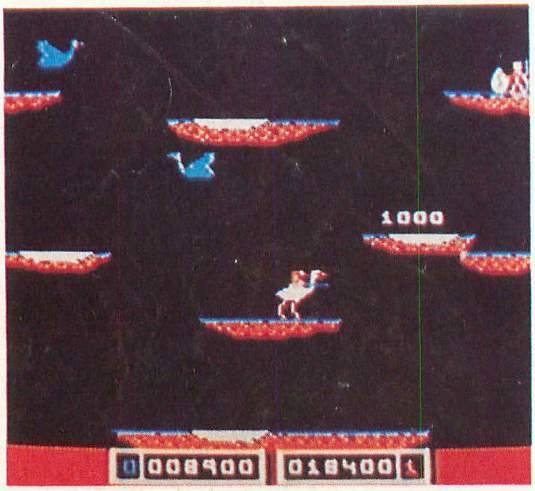

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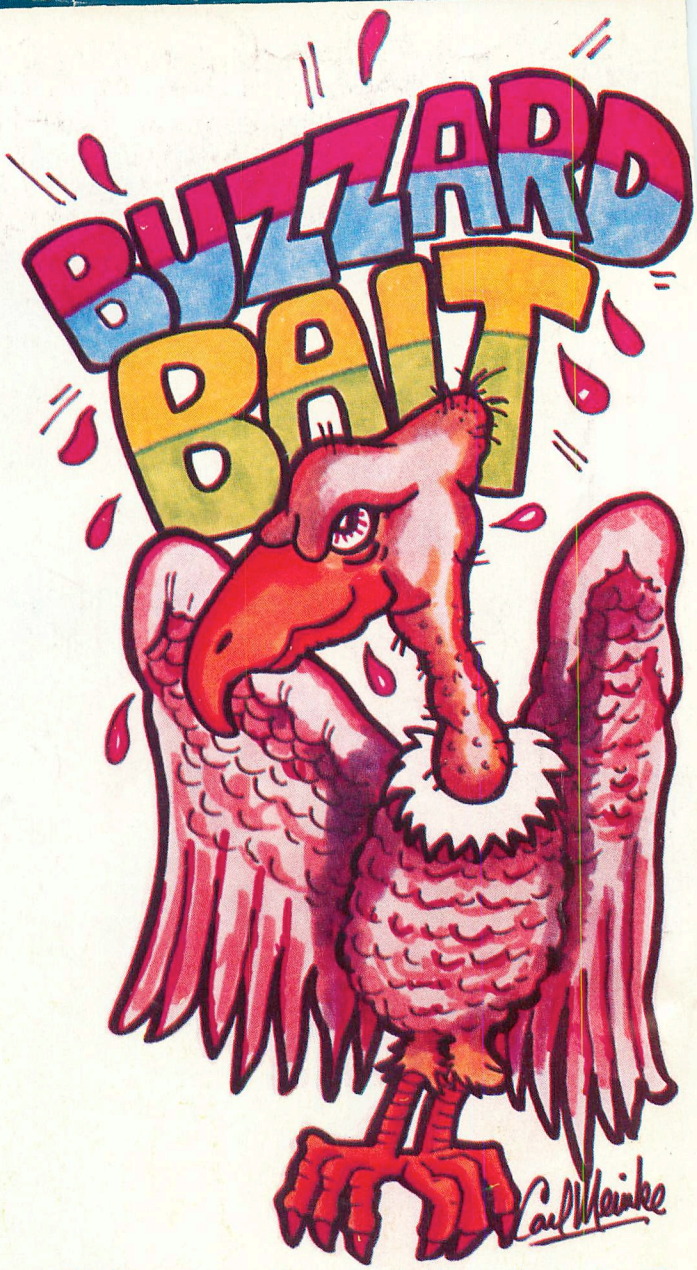

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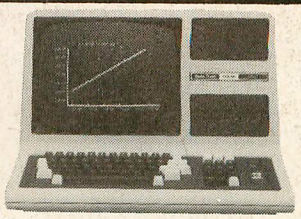

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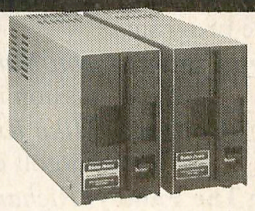

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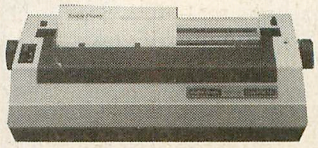

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Under the Rainbow

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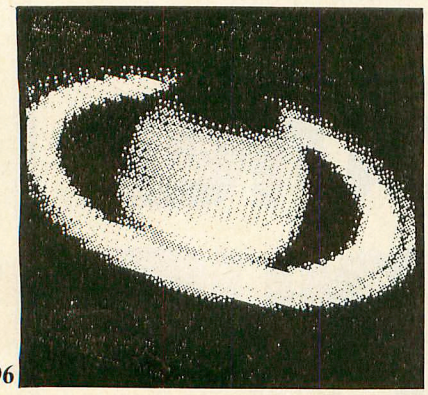

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NEXT MONTH: March is our Business issue and we'll have some strictly business applications for the Color Computer in the home and in small businesses. For instance, we'll show you how to use an electronic spread sheet program to organize a business trip and how to use it to keep track of auto expenses. We also will have a cost calculation program for business use, a listing to provide first-time buyers a look at the total cost of home ownership, a program to project the effects of inflation and a special called "Lil' Ole Person's Goldpile."

It won't be all work and no play for CoCo in March, though, because our March issue has a full measure of games, utilities, home helpers and educational programs — including some three dozen hardware and software reviews.

In March, as in every month, look to *the Rainbow* for more on the Color Computer than is available from any other source.

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February 1984 Vol. III No. 7

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letters to RAINBOW

ROOM AND BAUD?

Editor:

I recently saw the following ad on BUYPHONE, Los Angeles' "Computerized Yellow Pages":

"ROOMMATE WANTED: I am looking for a roommate to share a two bedroom apartment in San Gabriel, CA. Rent is $225/month. You also may have partial use of my IBM PC computer."

Is Los Angeles setting a trend towards "Room and Baud?"

William Lappen
Los Angels, CA

A CHARITABLE CONTRIBUTION

Editor:

San Pable Institute, a non-profit public charity, is forming a computer education program for economically disadvantaged children in San Francisco, especially those whose families would otherwise be unable to afford computers and extensive instruction. The club is a free service program of San Pablo Institute. No membership fees are charged nor are children expected to pay for any club services. The computer club offers programming instruction and gives children an opportunity to meet and share ideas with other children interested in computers, allowing them to constructively apply their time, talents and intellect.

The San Pable Computer Club is seeking donations of computers and peripherals. Equipment that is donated will be lent out to club members for "hands-on" learning at home. All donations are tax deductible and we pay for shipping.

Get a tax break on that old clunker and receive the satisfaction of knowing that the computer you cut your teeth on is being put to good use by a kid that couldn't otherwise have a computer at home. To donate, please write me: San Pable Institute, 234 Mullen Street, 94110.

Keith Wood
San Francisco, CA

INFORMATION PLEASE

Editor:

First, I would like to congratulate the entire staff of *the Rainbow* for producing a truly fine magazine. I have been unable to find another magazine that is even comparable to yours. Thanks!

Also, I have been looking for what is called a "host" program for my Modem II. Is there such a program around for the CoCo? If anyone could help me I would greatly appreciate it. My address is 14 Sunset Trail, 07866.

Scott Doering
Rockaway, NJ

CAR GAMES WHERE ARE YOU?

Editor:

I am a subscriber to your helpful magazine. I am also a very concerned game player. My favorite kind of game is a car game. In the past months I've been looking for a program for a car game and there doesn't seem to be many in your magazine. If anyone who also reads the magazine is interested in helping me, send in your car games! Please!

Scott March
Barrie, Ontario

DRAWING DILEMMA

Editor:

Does anyone know of a machine language program to draw a line between two points in the highest graphic mode (6R)? I have a ML points routine and a great three-dimensional object rotation program that puts people to sleep watching Color BASIC draw. Please help: 2232 Grand Ave., 14301.

Joseph Fiore
Niagara Falls, N.Y.

Editor:

I need a program that I can use my CoCo to send Telex overseas. I am not very familiar with this subject and so I sincerely wish you can give me some advice.

What kind of program I am looking for? Does anybody already have the program on the market? (for CoCo)?

Sure appreciate a quick answer. I am forming a company now and really wish my CoCo can do something for me. Thanks a million.

Roland C. Wong
El Monte, CA

Editor's Note:
There is a system from Western Union called "Easy Link" that can be used to send Telex, cables and all sorts of other stuff. You can buy a subscription from ComputerWare.

Editor:

For a long time now I have wanted to start my own BBS, but since I am only 14 years old, I haven't had a lot of money for a BBS program. Then when I got your November issue on Data Communications, I was thrilled when I read the "Supreme Sysop" programs, but I have a question: Do I have to have a disk drive and disks to run it, or can I use cassettes?

Ken Clark
Washington, DC

Editor's Note:
Sorry Ken, a disk is required for this particular BBS.

COCO POWER

Editor:

Are CoCos better than Vic 20s, Commodore 64s, TI-99/4As and Atari computers?

I'd like to know because my friends think that CoCos are second rate computers and that Vic-20s have better graphics than CoCos do. Also I'd like to know about how many software programs there are for the CoCos.

I think that your magazine is the best TRS-80 Color Computer magazine. Thank you.

Eric Onoferychuk

Editor's Note:
Give your friends a copy of *the Rainbow* and let them look at the ads. Ask them if all of these programs can run on their computers.

Editor:

I would like to upgrade my computer to 64K. Being in Germany, I am unable to get the job done by Tandy, however, I understand there are chips on the market which are easily fitted by the owner. If you could give me any information on reliability of makes and ease of installation, I would be very grateful.

Philip Judd
Detmold, Germany

Editor's Note:
You need eight 4164 chips. Most suppliers give installation instructions.

Editor:

Has anyone ever discovered how a program tape (from CoCo) can be loaded into a Model III? I want to use the Model III printing facilities but cannot load my CoCo type into the Model III. Can anyone advise? My address is Box 504, 12839.

Glenn Churchill
Hudson Falls, NY

Editor:

I have recently purchased a GEMINI-10X printer. I am very pleased with its capabilities, yet I am having a difficult time understanding how to use the Bit-Imaging and the downloadable characters. The manual that came with it was much too vague for me to comprehend it. Any help would be greatly appreciated.

Rich Trawick
North Adams, MI

ADVENTURE: PITS AND TIPS

Editor:

I tried out many Color Computer magazines and found yours was the best. There was so much in it compared to other magazines.

I just purchased two Adventure games: *Pyramid* and *Madness and the Minotaur* from Radio Shack, about two weeks ago. Right now I am stuck in both.

In *Pyramid,* I can't make it past Pharoah's chamber, the one with the serpent in it. And in *Madness and the Minotaur,* I'm having problems getting out, killing monsters and obtaining spells. If you know the solution to any or all of my problems, then send it to me at: 203 South Road, 06447.

Jay Aust
Marlborough, CT

Editor:

To all those Adventure addicts out there who are having difficulty getting past the snake in *Pyramid* or are stuck at the sarcophagus in *Sands Of Egypt,* don't despair. Here are some hints from someone who was once in the same predicament. In *Pyramid,* the bird statue will defeat the snake when thrown if you find a way to carry it, but beware the ANKH STAFF. The last treasure that no one can seem to find is within the maze, past the pit. When you find the pit in the maze, go east once more then northwest, and don't ever waste the coins on batteries.

In the *Sands Of Egypt* you must place the scepter on the sarcophagus to get to the treasure room. If you didn't get this far, then you must go into the pool and drain it, then go down with the torch lit and use the boat and shovel as an oar. What ever you do, don't drink the water in the stream. Good luck and keep Adventuring.

Steve Jeromos
Hauppauge, NY

HINTS AND TIPS

Editor:

Frank Garhau's line voltage fluction problem is not uncommon. May I suggest that he, and all others with this problem, purchase a constant voltage transformer. Not only do these correct for line voltage fluctions but also offer excellent protection against over voltage surges. For computer use only, a 30VA size is adequate however to feed the CoCo and the disk drive, a 60VA size would be required. The best known supplier of CV (constant voltage) transformers is Sola Electric Co., 1717 Busse Road, Elk Grove Village, Ill. They can supply the names of a distributors. Allied Radio, Ft. Worth, Texas also has CV transformers.

Francis Sherwood
Ft. Pierce, FL

CHANGING A ROUTINE

Editor:

In *POKEing* up the *Disksort* routine submitted by Matt Stephens on Page 64 of the December issue, I found that it performed two sort routines, the primary sort was on the "EXT" and secondary sort on "FILENAME," hence the final product is alphabetical on the EXT first and FILENAME second. In order to list the "FILENAME.EXT" in alphabetical order, the following changes were made. Delete lines 190 thru 260 and make the following change to line 270.

```
270 FOR X=1 TO S:E$(X)=MID$(F$(I),
    9,3):NEXT X
```

By making this change, the routine runs very good in sorting the directory by file name.

Since all of my files and other material is listed in alphabetical order I found this routine extremely helpful in allowing my directories to also be the same way. Thank you, Matt, for an excellent utility.

Barry Baker
Pacific Beach, CA

Editor:

You know how good *Rainbow* is so I don't need to tell you that, just that I love it and don't even thumb through the other CoCo magazines any more. Here's a handy hint I don't think I have heard of anywhere:

For short but frequently used programs, I keep one working copy of each on Realistic Endless Loop cassettes (R.S. Cat. No. 43-401 for 20 second loop or 43-403 for 15 second loop). The big advantage is never having to rewind these utility tapes. Just insert cassette, *CLOAD,* and *RUN.* This saves time and you don't feel guilty about wasting tape by *CSAVE*ing only one program on a regular cassette.

I'm using a 16K ECB CoCo, Epson MX-80 with Micro Works S/P interface and a

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Don Langer
Duncanville, TX

Editor:

Regarding Craig M. Arnold's hint in December on undocumented edit commands A, Q and E:

Also undocumented is command nKc, a handy tool that deletes characters from the cursor position up to (but not including) the "nth" occurrence of character "c," just as on the Model II or III.

Gary L. Carter
Bloomington, Ill.

FIREFLY'S REVENGE

Editor:

I caught an error in Josef A. Laake's program, *The Laserworm and The Firefly*. In line 26 it reads:

26 POKE 65495.0: CLEAR 350.16375

The periods should be commas. The line should read as follows:

26 POKE 65495,0: CLEAR 350,16375

Jim Partridge
Clinton, CT

Editor:

For those going to disk systems for the first time and experiencing difficulty with the high speed *POKE* (65495,0) do the following:

Use a soldering iron or wire cutters to lift one leg of C85. This is a little disc ceramic capacitor near pin 40 of the catridge connector. I have an "E" revision CoCo. The CP number (C85) may be different on other revisions.

Also, I would like to correspond with anyone who has built up and is programming the general automation A43-8910 music synthesizer project. If interested, please write to me at 5131 Raywood Lane, 37211.

Brian Carling
Nashville, TN

A WINNING TIP

Editor:

I truly enjoy your magazine, and was especially interested in Joe Kohn's *Color Blackjack* which appeared in the October 1983 issue.

I understand why Mr. Kohn chose to randomize his bets, but in reality few people use this method.

A winning tactic would make use of the card counting techniques spoken of in the article. I offer the following lines of code to do just that.

Anyone interested in how the calculations were arrived at would also be interested in the book "Beat the Dealer" by Edward O. Thorp.

```
900 IF QWL2 THEN BT=10 ELSE BT
=10 * QW:BT$=MID$(STR$(BT),2):
DRAW"BM20,102;C4": X$="your bet is
$"+BT$+"!":GOSUB 1490
905 BT$=MID$(STR$(BT),2):
DRAW"BM20,102;C4":X$="Your bet is
$"+BT$+"!": GOSUB 1490
1290 QW=QW+ZY:LINE(0,68)-(255,
102),PRESET,BF:LO=0
1675 QW=0
1770 ZY=0:T=0:FORX=0 TO K
'A=NUMBER OF ACES
1781 IF CV(CD(H,X))> THEN 1785
1783 IF CV(CD(H,X))<7 THEN 1787
ELSE 1790
1785 ZY=ZY - 1:GOTO 1790
1787 ZY=ZY + 1
```

Lines 900, 1290, 1770 would be easiest to edit to make changes. The others should be added to existing program.

Philip A. Brouillet
Queens, NY

WHAT'S IN THE NAME?

Editor:

Ever since I bought my 32K Color Computer with a disk drive in January, I have met sharp prejudice when I mention that I have a Color Computer. I love this machine and find it to be more powerful than machines costing two and three times more. So I set out to find the reason for their ridicule; and I can now share my findings with you. It's the name, "Color Computer," a child's toy.

I may have also found a way to get over their put downs, *change the name*! I say we call our powerhouses the Model VIII (reason: an eight bit microprocessor). People will think it is some new innovative TRS-80, and the CoCo will finally get the recognition it deserves.

Mark Charney
Denville, NJ

WILD AND CRAZY CRIME

Editor:

I am enclosing the original of a clipping from the *Des Moines Register* dated October 13, 1983, captioned "Woman sues over computer message." The body of the short article indicates she filed the lawsuit (civil, not criminal) because her boyfriend called her computer terminal and left a message intended to intimidate and annoy her.

> IOWA CITY, IA.(AP)—An Iowa City woman claims in a lawsuit that a former boyfriend harassed her by sending a message to her computer terminal.
>
> In the suit, filed in Johnson County District Court, Lisa Schmidt alleges that James Brucher, also of Iowa City, sent a harassing message to her computer terminal. The message, according to court documents, said Schmidt was a "wild and crazy woman."
>
> Schmidt said she and Brucher had dated, but were not dating at the time the incident allegedly occurred.
>
> Schmidt claimed Brucher typed the message with the intent to intimidate and annoy her.

My first reaction was amusement, but on reflection, it occurred to me that many persons might not realize that in Iowa and many other states, it also constitutes a crime to use the telephone in this manner. With the proliferation of home computers and modems, people should be made aware that they should not call someone with a modem to harass or intimidate them.

J. Hobart Darbyshire
Iowa District Court Judge
Davenport, IA

BULLETIN BOARD SYSTEMS

Editor:

We'd like to let the readers of *the Rainbow* know about our new Bulletin board, the Falcon Color-80, that is now online 24 hours a day in California. We're a CoCo board, but we welcome all computer users.

In addition to our electronic mail section, we also have full upload and download capabilities. We welcome comments on our BBS, and hope to hear from your readers soon. The Falcon Color-80 number is (707) 437-3663.

Craig, Keith and Dan Daniel
Fairfield, CA

Editor:

As a follower of all the great services your magazine gives, I would like to say thanks.

And now offering another great service for the CoCo, I am introducing "Creme De CoCo," Chicagoland's very first Bulletin Board service offered exclusively and most comprehensively for the Color Computer. The number is (312) 597-8485 and is available 24 hours, seven days a week except for occasional maintenance.

Eric Thred
Blue Island, IL

Editor:

Saginaw's first Bulletin Board for the RS Color Computer is now undergoing testing. Technical information: protocol—8 data bits, 1 stop bit, no parity; Baud, 300; data line, (517) 793-1579; hours (E.S.T.), 4 p.m. to 10 p.m. Monday-Friday, 10 a.m. to 10 p.m. Saturday-Sunday; LOGON [ENTER]. For more information write 4814 Schneider St., 48603, or call 793-9035.

Tom Schopp
Saginaw, MI

A WEAVING WEB

Editor:

I have an idea for what I think will bring some *Rainbow* reader/programmer a lot of fame. My idea is for a game for the CoCo called "The Tholian Web." Remember the famous Star Trek show? If I could write the game I would, but I'm not that good yet. The object of the game would be to try and beam aboard all persons alive from a damaged starship, before the Tholians complete their web, then escape the web. The other starship would be "blinking" out often to make the game hard. Also, include 100 people on the ship and your transporter can only beam six at a time. The ship will appear at different locations, unknown to you. This game could be done in Extended BASIC. And *Rainbow* could print it! So, all you *Rainbow* readers who are looking for a new project, I dare you to try this one. Who knows, you may be famous for it one day! My address is 1502 Holly St., 39437.

J. Michael Long
Ellisville, MS

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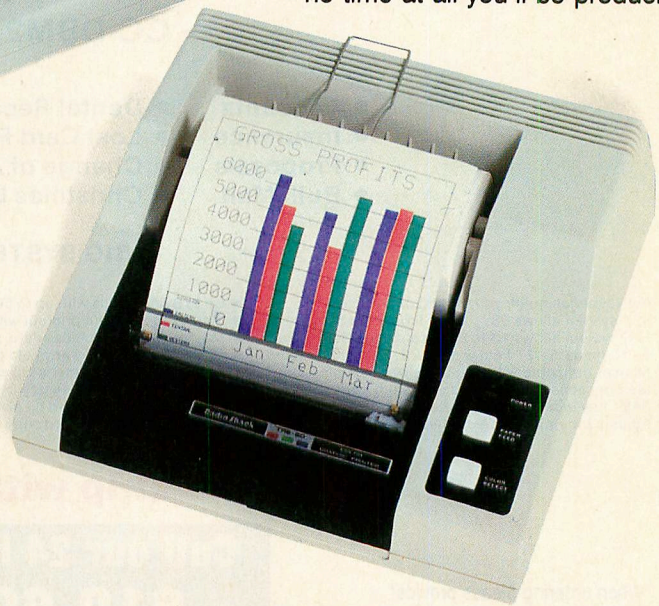

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great-looking drawings, charts and diagrams! The Standard BASIC language includes data and string handling capabilities, dimensioned arrays, math functions and 9-digit accuracy.

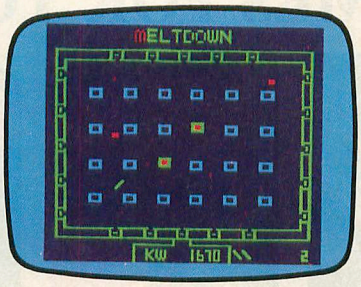
Easy to Expand. The Color Computer expands when you're ready with a cassette recorder, joysticks, color mouse controller, printer and telephone modem. You can add more memory and up to four disk drives, too!

Extend Your Abilities. Want to create high-resolution graphics or write sophisticated programs? Then the 16K Extended Color Computer 2 is the answer. You'll find it's easy to create elaborate geometrical shapes and drawings—even simple animation! You can even teach yourself how to create your own arcade-type games. You get all the great features of the 16K Standard version, plus Extended Color BASIC's powerful programming features, such as PEEK, POKE and USR commands, multi-character variable names, string arrays up to 255 characters, full-featured editing and tracing. You also get both the Standard and Extended BASIC tutorial manuals, so you can become an expert programmer in no time at all.

CGP-115 Color Graphics Printer. A perfect match for the Color Computer. It easily prints charts, graphs, computer-generated "doodles," programmed pictures and more in red, blue, green and black on 4 1/2"-wide paper. Commands built into this "smart" printer simplify drawing and plotting. Text mode prints 40 or 80 characters per line at 12 characters per second. Software controls additional character sizes and rotation. The CGP-115 uses easily replaceable ink cartridges. Measures only 2 15/16 × 8 1/4 × 8 1/2" and weighs just 1 3/4 pounds!

TP-10 Thermal Printer. The affordable way to get program listings, text and data printouts. Prints non-color graphics, too. And TP-10's thermal operation is so quiet you'll hardly know it's there! Text mode prints 32 characters per line at 30 characters per second. A special repeat function makes graphics programming easier than ever! Uses 4 1/8"-wide paper. Measures just 3 × 8 × 5".

Available Nationwide. Find out how your family can benefit from owning the exciting Color Computer 2. Visit your nearby Radio Shack Computer Center, participating store or dealer today and ask for a "hands-on" demonstration.



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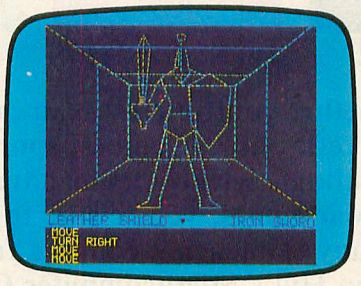
Meltdown at a fusion reactor! Take control of the reactor's computer system to try and contain the wandering atoms! A real-time game to test your skill and dexterity.



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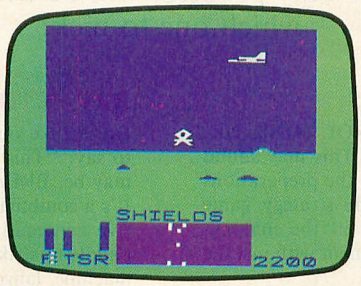
You're pitted against a succession of awesome beasts. Each victory brings you closer to your enemy—the wizard!



New! Star Blaze* for Galactic Fun

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Your mission: protect the Milky Way. Seek and destroy alien vessels, then check the radar for the next wave. There's no let-up in the excitement.

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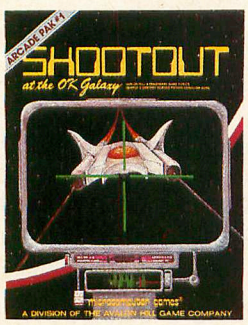
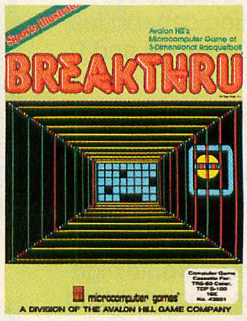


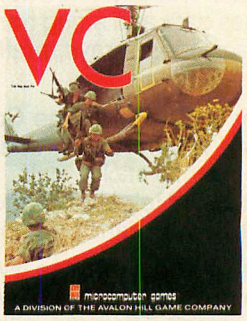
ARCADE

WARGAME

SCIENCE FICTION



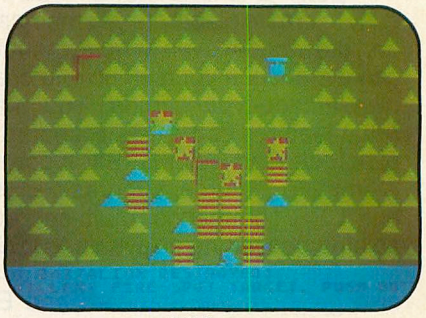
SPORTS



WARGAME

Shootout Screen

Whether your interest is in quick-reflex **arcade** games, **sport** simulations, **science fiction** adventures or **war games**, you're sure to find many challenging contests from Avalon Hill's **Microcomputer Games.** Your only problem will be deciding which one to pick!



VC Screen

SHOOTOUT (at the OK Galaxy)

30 ALIEN WARSHIPS HAVE ENTERED YOUR PATROL ZONE. OK, shields up?, energy level . . . check, azimuth set? Yup. This may sound like the latest summer space movie thriller but in fact it's the preparations YOU will make when playing Avalon Hill's new **arcade** strategy game SHOOTOUT AT THE OK GALAXY. Over 2 years in the making, SHOOTOUT is purely graphical combining arcade excitement with just the right touch of strategy.

Cassette for TRS-80® Color (16K): $20.00

VOYAGER

A solitaire **science fiction** game that challenges you to explore the four levels of an alien spacecraft's maze-like corridors and rooms in 3-D simulated graphics, all the while avoiding robots programmed to blast any intruders. In order to win, you must destroy all power generators and escape or hunt out and annihilate all of the killer robots. VOYAGER comes with color-animated graphics and sound capabilities for computers so equipped.

Cassette for TRS-80® Color (16K): $20.00

MIDWAY CAMPAIGN

Your computer controls a huge force of Japanese ships whose objective is to invade and capture Midway Island in this tense **wargame**. In the actual engagement, the Japanese made several tactical errors which cost them the battle. Your computer probably won't make the same mistakes! You command the badly out-numbered and outranged U.S. Naval Forces. Your only advantage is surprise.

Cassette for TRS-80® Color (16K): $16.00

BREAKTHRU (in 3-D)

Don't take our word for it! Here's what *Color Computer* magazine has to say: "This is truly a good game". Short and sweet as this description may be, BREAKTHRU is really much more than just a truly good game! It's a combination of racquet and WALLBALL. The object is to knockout five consecutive walls at the opposite end of the court using a joystick paddle to strike or deflect the lively ball. BREAKTHRU is written in pure machine language to give you a fast-action, three-dimensional, high-resolution **sports** experience for hundreds, maybe even thousands of hours of entertainment.

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V.C. (short for Viet Cong) is Avalon Hill's first **wargame** on the controversial Viet Nam War. Under your command is the chopper based air-mobile and heavily armed 1/509th Air Cavalry and 9/15th Field Artillery for fire support. It is an unconventional conflict. You have the task of bringing the civilian population under your protection where the enemy can hide amongst the people, and where the politics of terrorism and friendship can turn the people you want to save against you. V.C. faithfully re-creates this struggle in which you can lose without ever being defeated.

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A DIFFERENT STANCE

Editor:

Your stand against software piracy is admirable and some of the measures that you have taken will surely have a positive effect, but I think you are off the track on one point. Specifically, your request that all tape copy utilities be removed from the market. This type of utility is essential for anyone that is trying to manage a reasonably large tape-based software library. Besides, anyone that is skilled enough to write a valuable program could easily protect it against a general purpose tape copy utility. I have written and marketed a utility program that, among other things, will, as advertised, copy "virtually" any program. The reason that I was able to do this was, up until now anyway, "virtually" all software for the Color Computer is minimally protected. A far more damaging program, which I would not advocate removing from the market, is the disassembler. Although it is very easy to defeat a general purpose copy utility, I challenge anyone to encrypt a program such that I could not "break" it with the help of a disassembler.

In my opinion, your stand on this particular issue will be more damaging than beneficial to the CoCo community.

Darrel Price
DP Development

Editor:

In the letters to *Rainbow* column of the December issue there is a letter from Ron Krebs of Mark Data Products. In the letter, Mr. Krebs states that none of their software is protected.

Well, Mr. Krebs, I own tape copies of both your *Astro Blast* and your *Color Haywire* programs and they are both autoexecuting with no way to back them up or convert them to disk.

If this is not protected, then what do you call it?

Marlin Simmons
Bridgewater, VA

Editor:

I have been following the controversy about piracy in your magazine with some interest. As a software producer I am interested in both a personal and professional way, and when I chose to publish *Omni-Clone* and *Clone-Master* I made it clear that I believe the consumer has a right to make backup copies of their tapes and disks to prevent loss.

Nevertheless, I have seen several letters from consumers that seem to make the same point (the latest was in your December issue), and I must respond.

The premise of these letters seems to be that commercial software for the Color Computer is overpriced, and thus it is fair game for the pirates. To quote one letter: ". . . and another firm puts out a lousy program for $17.95, so who is the pirate?"

Frankly, I find this entire premise to be so much throughput from male cows. I personally think that new cars are high in price, but that certainly gives me no right to steal them! It amazes me that anyone could even suggest such an idea.

As consumers you have the final power in this market, but it isn't the power to steal and then justify it with some self-righteous gobbledygook. It's quite simple. If I think the cars are too expensive, I am free to not buy them, and as a merchant, I am free to price my products however I like. If someone thinks a program is too expensive, they are free to keep their money in their wallet. If you think differently, try shoplifting something from a high priced store in your area, and then tell the judge it was okay, because the stuff was overpriced anyway. No, that's just not how it works. But, as the man said in the last line of his letter, "everyone wants an alibi."

William A. Nolan
Prickly-Pear Software

KUDOS

Editor:

Thank you for the excellent quality magazine you are publishing. It gets better with every issue. I would like to suggest that you publish more articles on the fundamentals of machine language programming. Many of the articles involving this type of programming are hard for me to understand, probably because I don't know what's going on.

Paul Cournoyer
Ballston Spa, NY

Editor:

Thank you for publishing a truly informative and excellent magazine. *Please* keep up the articles on assembly language, and the hardware articles. There should be at least one, maybe two or three hardware articles each month in *Rainbow*. I will try to eventually contribute some ideas or articles myself.

Brian Carling
Nashville, TN

Editor:

The Rainbow is the greatest thing that has happened to the Color Computer.

My thanks to Dan Downard for the CoCo Nets on Amateur Radio. I'm glad I also get *Rainbow On Tape*. The Amateur Radio-Frequency Allocations by B.B. Witham Jr., in the December issue, is a long one. I also like Jorge Mir's "practical" programs.

Hamilton C. Agpawa
Chicago, IL

HOW DOES NIDA SPELL RELIEF?

Editor:

Relief can also be spelled FRAYSSE, for allowing himself to be on call when uncoordinated fingers fumble through his *Marathon*. And what a game that is! I'm too old and slow to play and succeed, but my kid plays it with *POKE 65465,0* although he occasionally slightly decreases speed by pressing the fire button.

I will continue to read *Rainbow* in hopes of learning all things wonderful, including what is a "bubble sort"; "screen dump"; "concatenate"?

Nida Lewis
Follett, TX

Editor:

I find your magazine very interesting and useful. The balance of software, hardware and tutorial articles is excellent! The continuing good articles are strong evidence that the CoCo is a powerful machine and a great choice for home computing.

One program I really enjoyed was *Rainbow Roach* by John Fraysse. I sent him a tape and he promptly sent back a copy which I found to be a super game. In fact a friend, who is an Apple devotee and sold computers for a while, was flabbergasted that such a fast, High-Res program could be done on a lowly CoCo. I'll be expecting to see more articles from John.

Keep up the good work! You have the best CoCo magazine going!

Mike Spring
Utica, MI

BOUQUETS AND BRICKBATS

Editor:

I just received a defective keyboard (which I'm sure does not occur very often). I sent it back for repair. The board was lost in transit.

After one phone call we (H.S.L. Products and I) came to an agreement that they would replace my keyboard and this was just on my word that if they did not receive the board and after the claim from our postal services came across, I would send them the amount of the claim (which might take up to six months).

As far as I'm concerned, H.S.L. is top notch in my book and I recommend their services. As the saying goes "you learn something new everyday."

My lesson for today is there are still some people who are honest, reliable and most of all have respect for customer relations.

Again, H.S.L., thank you.

Richard Nantel
LaSalle, Quebec

Editor:

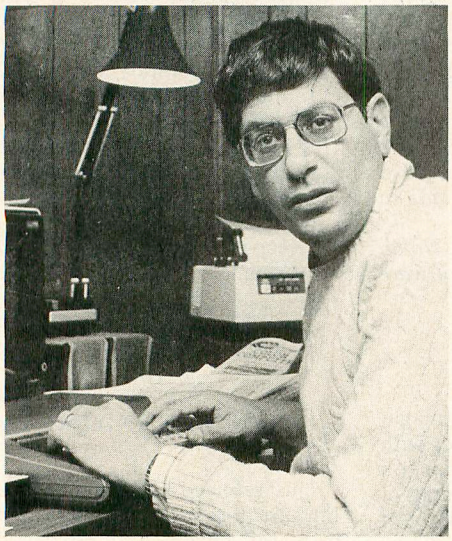
I'm not one to complain but in this case I've just got to speak up. My "beef" has to do with the advertisements I see in *the Rainbow*.

Now, I don't want you guys to stop using pretty girls to catch the reader's attention, but there are quite a few feminine fingers flickering over the keyboard (me, for one) and speaking for myself I wouldn't mind seeing a nice looking young man touting software, or hardware for that matter. A good looking guy smiling over a disk drive or, say, showing the maneuverability of a joystick would catch my eye and hold my attention at least long enough to find out who the dealer is.

I really do think you produce one of the best magazines for the CoCo around. I really look forward to mine coming the first part of every month, that is if the postman doesn't decide to read it first.

Evalea A. Siverly
Terre Haute, IN

PRINT #-2,



This is our big Adventure Issue and it is a pretty auspicious occasion for *the Rainbow*. First of all, this marks the beginning of our Second Annual Adventure Contest and the publication of the first book that Falsoft, Inc., our parent firm, has ever put out.

I was really pleased with the first Adventure Contest for several reasons. First of all, it made us a lot of new friends, and second, it brought some real quality programs to *the Rainbow* and to you. And we expect that this year's contest will be much the same — but, probably more so.

First prize in the Second Annual Rainbow Adventure Contest is a complete disk drive 0, including controller. This prize is being offered by *the Rainbow*. Other prizes will be announced next month but, this time around, everyone who enters gets a bonus: A free three-day pass to the **RAINBOWfest** of his or her choice. When you send in your entry, please specify which **RAINBOWfest** you want your free ticket for.

The rules for the Second Annual Rainbow Adventure Contest are pretty much the same as last year. All programs become the property of Falsoft, Inc., and none can be returned. By entering the contest you warrant that the work is yours originally, and that you have the right to offer it as yours. Winners will be notified by mail and telephone, so please make sure we have both your address and telephone number.

Finally, there is the deadline. All entries must be postmarked on or before May 1, 1984. (We have extended our March 1 deadline that we previously announced.) Also, entries *must* be submitted on magnetic media — disk or cassette. Please be sure to give us complete loading instructions and, as you feel necessary, give us plenty of information on the game. Also, for the purposes of judging, please give us the *answer* to the program. In order to properly judge the contest, we have to know how a player can win and what happens when he or she does.

Secondly, as you read this, *The Rainbow Book of Adventures* is available. You might check your local store that carries *the Rainbow* to see if they have it in stock. If not, you can order it from us or from several of the mail order firms which we anticipate will be advertising it. Cost of the book is $7.95 (Kentucky residents please add sales tax if you order from us). A tape version of the Adventures is $8 and, yes, just like *Rainbow On Tape*, you must have the book to get the instructions on how to load and run the programs on the tape.

We think both are a bargain. We've tried to keep the price low in order to make it as affordable as possible. There are 14 programs in the book and on the tape and the book is an attractive 100-plus pages with nice artwork, a four-color cover and a true "spine," just like *the Rainbow* itself.

I'm really proud that we have been able to publish this, our first book. More will be coming. And, it would be very inappropriate to mention *The Rainbow Book Of Adventures* without mentioning the names of Susan Remini and Peggy Henry, the editorial and art directors for this project. Both of them worked long and hard extra hours and are justifiably proud of what they have accomplished.

And we're proud to be able to bring it to you!

By the time you read this, **RAINBOWfest** will be close at hand in Long Beach, California. I believe it is going to be a great show, but I told you a lot about that a month ago so I won't repeat myself here.

However, we have some extra special things which have just come together that I think will add a little icing on the cake to this **RAINBOWfest** that will make it even more worth your while to come.

First, Phil Kitchen, who runs the Third Party Software Support operation for Radio Shack will be conducting a special seminar during the show. As you may know, Radio Shack has a program which helps software authors and Phil will be explaining the program at length. It will also give you an opportunity to ask questions concerning Third Party Support. It is a must if you are in the software business, or have any interest in becoming involved.

Second, Radio Shack will be conducting a show-long class on computing and CoCo during **RAINBOWfest**. Here's a great chance for some extra hands-on instruction about CoCo and, too, here is an opportunity for you to "turn on" a friend, neighbor, child or spouse to the wonderful world of CoCo. Admission to the classroom is included with your admission to **RAINBOWfest** itself.

All that, plus the best single Color Computer show ever held, makes Long Beach look great. I hope to see you there!

(continued on page 304)

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THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...
— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW CERTIFICATION SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor... outstanding in every respect.
— The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add $2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

COLOR CONNECTION SOFTWARE

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ATTENTION!!

Watch for next month's ad to see some exciting new products from COLOR CONNECTION SOFTWARE, including our first strategic arcade game!!

COLOR DESIGNER

The ultimate Hi-Res Graphics Processor!!! Great for doodling, sketching, and most of all, creating entire graphics screens. Options include; 8 key cursor control with key repeat, Draw command that follows your cursor, FILL command that "PAINTS" the screen with more than 1000 different color/texture combinations, and much much more!!

16/32K cas $26.95 disk $28.95.

QUIZ ALL

A versatile quiz program. Has study and test formats and allows printing of quiz. Even includes an option for the computer to generate multiple choice answers!

cas $18.95 disk $20.95

COMPU SCRIBE B.S.A.

Got a headache keeping track of merit badges, rank advancements, etc. Compu Scribe keeps tabs on the whole troop and creates printouts by scout, by rank, or alphabetically. Requires a printer with 132 character mode.

Available on disk only - $26.95.

OKI DUMP

Eight bit screen dump from CoCo to an Okidata printer without ,dot addressable graphics! Includes hints on printing pictures of game screens, etc. ("The King" by Tom Mix, is the example) a steal at

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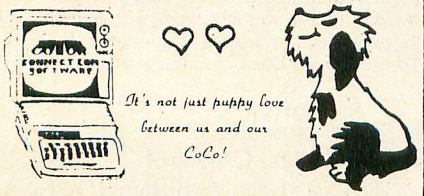

All cassette orders include disk version on cassette with instructions to transfer to disk. Unless otherwise specified, programs require 16K extended for csssette or 32K extended for disk. Add $2.00 shipping and handling. Utah residents add 5¾% sales tax. Orders paid by personal check allow 1-2 weeks; all others shipped within 48 hours. No COD.

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1060 Buddlea Drive, Sandy, Utah 84070

For information:
Call Weekdays between 6:30 pm and 10 pm MST
(801) 571-5023

BUILDING FEBRUARY'S RAINBOW

Our Adventure Issue . . . Basketball to Image Processing . . . And, Introducing Rainbow Tech . . .

Yes, it's Adventure Contest time again and we not only have plenty of prizes for our Second Annual *Rainbow Adventure Contest,* but we also have several tutorials to get you started and some sample programs for you to learn from — including *Karrak,* a special four-part Adventure written by one of last year's top contest winners, Gregory Clark. The contest deadline for entries is May 1, 1984, and we'll award prizes in all sorts of categories so, even if you're a novice Adventurer, you have plenty of time to develop an entry.

Check out Captain 80's column for his "Adventuring in Style" commentary, and also read Liddil's tutorial on how to create a winning Adventure. Then, Eric Tilenius will provide an excellent short course in Adventure programming as he walks you through the creation of his *MiniAdventure.* For still more, head for the jungle in search of King Merro's crown in Jeff Craig's Adventure. And, when you begin *Karrak,* take my advice: Don't mess with the turtle.

Back issues of *the Rainbow* have many other Adventures and Adventure tutorials if you want to learn more before you try your hand and, yes, *The Rainbow Book of Adventures* is a reality, 112 pages of winning programs from last year's contest. It's $7.95 and, if you can't find it at your computer store, call or write us — and ask about the *Rainbow Adventure Tape* ($8), too.

Adventure and more. How about golf? Mike Knolhoff offers us an invitation to "The CoCo Open" in one of several games in this issue. On the more serious side, Dr. Bob Tyson, winner of our recent simulation contest, delves into "image processing," a technique used to enhance pictures sent back by space probes.

Both the game and the statistical sides of basketball come into play in this issue as Gary L. Carter offers a sports simulation and Dick White gives us a computer program to keep up with all the game stats from your favorite teams.

Making its debut this month is "School is in the Heart of A Child," by longtime *Rainbow* columnist Bob Albrecht and his new co-author Fran Saito. We welcome this series for the parents of very young children with the expectation that it will be as big a success as Bob's continuing series, the "GameMaster's Apprentice."

Also new this month is *Rainbow Check Plus,* by H. Allen Curtis. Allen offers us a markedly improved version of our familiar *Rainbow Check* program begun in January 1983. This month, values for both our old checksum program and Allen's new one appear in the "checkboxes" at the beginning of each listing, but next month we will begin using this new version exclusively.

Still another addition is RainbowTech, a special section for the more technically minded. While it is by no means forbidden territory for the beginner, we are putting some of our more advanced features in this portion of the magazine. Dale Puckett's "KISSable OS-9" will be a regular RainbowTech column. And Rainbow Technical Editor Dan Downard — we call him Dan Landers around these parts — will answer your technical questions in his new monthly Q & A feature, "Downloads."

Joining us this month and rounding out the faculty of RainbowTech are two CoCo community celebrities, Frank Hogg and Paul Searby. Frank will be writing about advanced operating systems, including OS-9, FLEX and 64K topics while Paul launches a regular feature on the design and development of application software for the CoCo.

No, we aren't offering advanced degrees from RainbowTech, but we do think there is much that can be learned by reading the *Rainbow,* and the tuition is very reasonable: For just $28, you get a full year's worth of educational material at a rate of more than a dozen pages a day. So, if your name's not yet on the roster, why not enroll and keep the Adventure going all year 'round.

— Jim Reed

FIRE COPTER

WITH 3-DIMENSIONAL GRAPHICS

JOYSTICK COMPATIBLE

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BY DALE LEAR

Down there — below and to the right — tongues of fire play across the face of a skyscraper like living things. Inside the copter, runaway temperatures nearly rip the consicious from your heat-punished body, momentarily throwing you off course. But panic taps a hidden reservoir of strength, and with an adroit push on the throttle, your FIRE COPTER continues to knife through the swirling plume of smoke, carrying its lifesaving water jets directly into the flames.

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- No special software required.
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- *Individually boxed with full instructions.*
- Professional, low profile, finished appearance.
- U.S. made—high quality, quad gold contacts.
- Smooth "Touch Typist" feel—no sagging.

Rainbow, April '83

A fine piece of hardware from Mark Data Products...It is super and it is professional too...If you are searching for a replacement keyboard, it is an excellent buy...

Hot CoCo, August '83

Like putting leather upholstery in your Volkswagen...Very impressed with the appearance and performance...Could easily pass as original equipment...Installation is very simple...

Color Computer Magazine, June '83

The installation procedure is well detailed and quite simple...Has a professional feel, reacts well to the touch... has held up to some purposeful pounding...

Color Computer News, June '83

Mark Data Products is well known to us "longtimers"... Every bit as finished as if Tandy had done it...The Mark Data Super-Pro is your best buy...The one that is in my CoCo to stay...

Great Computer Software Also

• Adventure Games • Arcade Games and Utility Software

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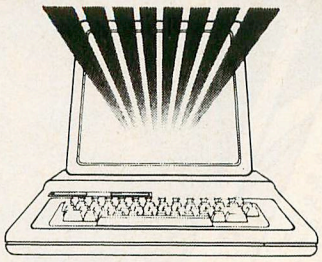
SUPER SCREEN



- **A big 51 character by 24 line screen.**
- **Full upper and lower case characters.**
- **Easily combine text with hi-res graphics.**
- **PRINT @ is completely functional on the big screen.**
- **The powerful ON ERROR GOTO is fully implemented.**
- **Auto-key repeat for greater keyboard convenience.**
- **Control codes for additional functions.**
- **Works with 16K, 32K or 64K computers.**
- **Available on disc or cassette.**
- **Works with extended and/or disc BASIC.**

51 CHARACTERS BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications so Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a confusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The difference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities.

CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home Up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will really please you; only $29.95 on cassette or $32.95 on disc!

ACCOUNTING SYSTEM

The Mark Data Products accounting system is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P&L or income report, an interim or trial balance and a balance sheet.

Up to 255 separate accounts may be defined and a single disc system can hold over 1,400 transactions. This system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Immediately updates the chart of accounts.
- Provides an audit trail.
- Includes end of period procedures.
- Is capable of future expandability.

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual.

Requires 32K and a Single Disc Drive
PRICE: $99.95

ORDER ENTRY SYSTEM

The Mark Data Products sales order processing system provides a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer, and one or more disc drives.

The MDP order entry system is a family or programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Produces a traceable invoice.
- Handles receivables as well as closed orders.
- Is capable of future expandability.

This order entry software equals or exceeds higher priced packages for other computers and includes a detailed operating manual.

Requires 32K and a Single Disc Drive
PRICE: $99.95

THE MARK DATA PRODUCTS
SUPER PRO KEYBOARD...

The most popular replacement keyboard for your CoCo.

- Original key layout.
- No special software required.
- Fast, simple installation—no soldering.
- Individually boxed with full instructions.
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IMPORTANT NEW BOOKS

"Your Color Computer" by Doug Mosher. Over 300 pages of detailed information—A CoCo encyclopedia. $12.95.

"Programming the 6809" by Rodnay Zaks and William Labiak. One of the best 6809 machine language texts available—required reference material. $15.95.

WE STOCK SOFTLAW PRODUCTS

The VIP WRITER Text Processor is rated tops by Rainbow, Hot CoCo and Color Computer Magazine. After evaluation we rate it tops too. **Disc $59.95.**

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SPACE RAIDERS—A sensational rendition of the arcade classic. No collection is complete without this invaders type game. Great sounds and tense action. We think it's the best. **Cassette—$24.95 / Disc $27.95.**

CAVE HUNTER—Maneuver your way to the bottom of a spooky old cave to retrieve the treasures. It's fun but not easy! Passages lead in all directions and angry cave creatures pursue you relentlessly. A fast placed arcade game. **Cassette—$24.95 / Disc $27.95.**

ASTRO BLAST—Wave after wave of alien attackers—each one different and unique. A great space "shoot-em-up" with hi-res graphics, lots of color and dramatic sound effects. A continuing best seller. **Cassette—$24.95 / Disc $27.95.**

HAYWIRE—This challenging combination of angry robots and the evil menace will provide many hours of fun and excitement. Haywire is the best Color Computer version of the Berzerk arcade game you can get. **Cassette—$24.95 / Disc $27.95.**

BLACK SANCTUM—If you enjoy suspense, you'll love this one. Encounter the forces of black magic as you roam around an old 18th century monastary. Watch out for the black hooded figures! **Cassette—$19.95.**

CALIXTO ISLAND—A challenging puzzle with an occasional twist of humor. You'll visit a secret laboratory, a Mayan pyramid and you'll meet crazy Trader Jack who adds to the fun. **Cassette—$19.95.**

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RAINBOW CHECK PLUS FOR THE COCO AND THE MC-10

By H. Allen Curtis

Since the January 1983 issue, *the Rainbow* has provided you with a program, *Rainbow Check,* to ease the labor of your typing its BASIC programs. *Rainbow Check* was the means of determining a class of typing errors that would change the byte count of a specified number of lines of BASIC programming.

There were some important classes of typing errors that *Rainbow Check* could not detect:

1) It could not distinguish between incorrect and correct line numbers, such as 300 CLS from an intended 390 CLS.
2) It could not distinguish between incorrect and correct variables, such as F from an intended E.
3) It could not distinguish between incorrect and correct command words, such as SIN from an intended SGN.

For your further convenience a new, more comprehensive checking program, called *Rainbow Check Plus,* has been developed. It will detect errors of the classes 1), 2) and 3) as well as the class detected by *Rainbow Check*. There are two versions of *Rainbow Check Plus*—one for CoCo users and another for MC-10 users.

The BASIC interpreter puts every program into the following form: Every number initiating a line of BASIC programming is represented by two bytes—a most significant byte and a least significant byte. Every command word is represented by a token byte. In the case of CoCo some command words are represented by 2-byte tokens. Each character, other than those comprising command words, is represented by a single byte in ASCII code.

Rainbow Check Plus includes each of the aforementioned bytes in the calculation of checksums. In those calculations *Rainbow Check Plus* employs a number system in which the successor of 255 is 0.

When you erroneously type 300 CLS when 390 CLS was intended, *Rainbow Check Plus* uses the bytes 1 and 44, instead of the correct byte values 1 and 134, in calculating the checksum. The ensuing incorrect checksum indicates that a typing error has occurred.

Similarly, when F is mistakenly typed for E, the ASCII code 70 is used instead of the correct code 69 in checksum calculations.

If a typed character is part of a valid BASIC command word, the value of the token used by the BASIC interpreter to represent that word is associated with all the characters in the word. For example, the value associated with F, O and R

(H. Allen Curtis, who earned degrees from the College of William and Mary, M.I.T., and Harvard, recently won an award for meritorious service from the IEEE Computer Society. He has had published a college reference book in the computer science field, as well as many papers and articles.)

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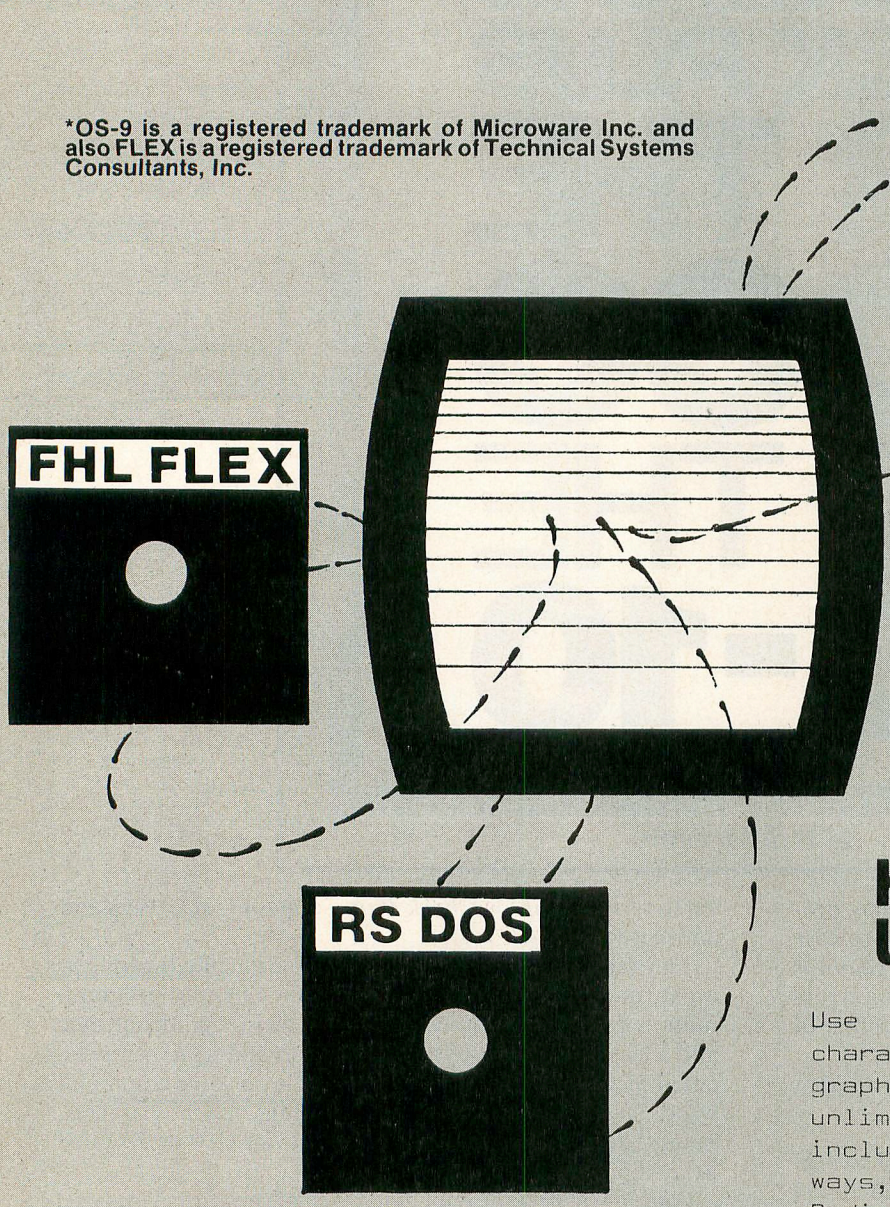

O-PAK

O-PAK for OS-9

Hi Res Screen & Utilities Package

Use one of the available Hi-res character sets, or create your own! Mix graphics with text on a screen with unlimited flexibility. The utilities include the ability to copy files three ways, between FHL FLEX, RS OS-9 and Radio Shack DOS. For CoCo OS-9 - **$34.95**

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LANGUAGES

A/BASIC COMPILER for OS9 and FLEX

Produce fast, compact, ROMable object code from easy to write BASIC source code.

OS9 or FLEX Object only: **$75.00** Available for CoCo

DYNASOFT PASCAL for OS9 and FLEX

This remarkable Pascal Subset is a p-code implementation that only requires 12K of RAM!

OS9:		FLEX:	
Object only:	**$69.95**	Object only:	**$59.95**
With Source:	**$99.95**	With Source:	**$89.95**

Available for Color Computer

NEW! DYNA-C for OS9 and FLEX

This new "C" subset runs circles around any others in its price class!

OS9:		FLEX:	
with Source:	**$109.95**	with Source:	**$99.95**

Available for Color Computer

INTROL-C COMPILER for OS9 and FLEX

A complete, efficient, fast C compiler which includes a Macro Relocating Assembler/Linking Loader, Runtime Library, and Library Manager.

OS9 or FLEX Object only: **$375.00**

Available for Color Computer

COMPUTERWARE'S RANDOM BASIC

11 Digits of precision. Conforms closely to the ANSII standard.

OS9:	**$195.00**
FLEX:	**$100.00**
CoCo FLEX Version:	**$ 75.00**

APPLICATION SOFTWARE

DYNASTAR SCREEN EDITOR / WORD PROCESSOR for OS9 or FLEX

This extremely powerful, menu-driven Word Processing system is composed of Dynastar, the Text Generator and Dynaform, the Text Formatter/Mail Merge program.

		Color Computer Versions:
DYNASTAR:		
for OS9 or FLEX:	**$149.95**	$49.95
DYNAFORM:		
for OS9 or FLEX:	**$149.95**	$49.95
Purchased together:	**$275.00**	$99.90

DYNASPELL Spelling Checker

Dynaspell is the most versatile 68XX Spelling Checker available. Use it with Dynastar or Stylograph for a complete word processing system. Now with new LOOKUP command!

FLEX or OS-9	$199.00
CoCo Version	$ 59.95

DO - JOB CONTROL LANGUAGE for OS9

This easy to use, "BASIC-like" Job Control Language is great for Batch processing.

CoCo OS9 version: **$49.00** General OS9 version: **$99.00**

RMS RECORD MANAGEMENT SYSTEM

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of FOR would be 128, the token representing FOR in both CoCo and MC-10.

Suppose that you mistakenly typed SIN when SGN was intended. In CoCo, the token for SIN consists of two bytes whose values are 255 and 132. These values would be employed in checksum calculations instead of the correct ones, 255 and 128, for SGN. In MC-10, the SIN token, 185, would be used instead of the correct value, 177.

Thus, it is seen that for every error you make in typing a BASIC program, an incorrect byte value is employed in *the Rainbow Check Plus* checksum calculations.

The Listings 1 and 2 show CoCo and MC-10 versions, respectively, of *Rainbow Check Plus*. It is part BASIC and part machine language. The BASIC part generates the machine language part which does the actual checking. The BASIC portion stores the machine language program at the 78 and 91 highest RAM addresses of CoCo and MC-10, respectively. Regardless of whether your CoCo is a 4K, 16K or 32K RAM system, the machine language program will be stored in high RAM. The former *Rainbow Check* did not support 4K CoCo systems.

You use *Rainbow Check Plus* as follows: Suppose you wish to type from *the Rainbow* a BASIC program having a *Rainbow Check Plus* box such as:

765....229
1600.... 37
END....184

With the machine language program stored in high RAM as a result of running *Rainbow Check Plus* (do not run the BASIC part more than once), type *NEW* and press [ENTER]. Then type all lines up to and including Line 765 of *the Rainbow* program. Next, press the down-arrow key of your computer. A decimal checksum will immediately be printed on the screen. It should be 229. If it is not, you have made a typing error. When you have correctly typed in all lines through 765, type all lines from 765 through 1600. Again press the down-arrow to display the next checksum. It should be 37, if your typing was correct. When you have all lines throuh 1600 correctly typed, finish typing the program. Then, pressing the down-arrow should display the number 184 if your typing has been perfect.

It should be pointed out that your typing accuracy can be further facilitated if you take advantage of the following fact: *the Rainbow* duplicates your computer's 32-character per screen line format in its presentation of BASIC programs. This makes it easy to discover whether or not your typing is properly spaced.

Listing 1 (CoCo):

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR25,X-1
30 X=256*PEEK(35)+178
40 FOR Z=X TOX+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT"DATA
ERROR":STOP
80 EXEC X:END
90 DATA 182,1,106,167,140,60,134
100 DATA 126,183,1,106,190,1,107
110 DATA 175,140,50,48,140,4,191
120 DATA 1,107,57,129,10,38,38
130 DATA 52,22,79,158,25,230,129
140 DATA 39,12,171,128,171,128
150 DATA 230,132,38,250,48,1,32
160 DATA 240,183,2,222,48,140,14
170 DATA 159,166,166,132,28,254
180 DATA 189,173,198,53,22,126,0
190 DATA 0,135,255,134,40,55
200 DATA 51,52,41,0
```

Listing 2 (MC-10):

```
10 CLS:X=256*PEEK(16976)+165
20 CLEAR 25,X-1
30 X=256*PEEK(16976)+165
40 FOR Z=X TO X+90
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW<>8995THEN PRINT"DATA ERRO
R":STOP
80 EXEC X:END
90 DATA 182,66,133,167,78,182
100 DATA 66,134,167,79,182,66
110 DATA 135,167,80,134,126,183
120 DATA 66,133,198,27,58,255,66
130 DATA 134,57,129,10,38,47,60
140 DATA 54,55,79,222,147,230,0
150 DATA 39,15,8,8,171,0,8,171,0
160 DATA 8,230,0,38,249,8,32,237
170 DATA 183,66,192,252,66,134
180 DATA 195,0,54,55,54,56,223
190 DATA 244,166,0,189,229,73,51
200 DATA 50,56,126,0,0,134,188
210 DATA 40,49,55,48,56,56,41,0
```

Hint . . .

RS-232 Baud Rates

These poke values for the CoCo will create the 16 most commonly used Baud rates. They are as follows:

Baud Rate	*POKE 149*	*POKE 150*
50	4	88
75	2	227
110	1	246
134.5	1	153
150	1	110
300		180
600		87
1200		40
1800		25
2000		23
2400		18
3600		10
4800		7
7200		3
9600		1

To achieve 19200 Baud, one must use the pokes for 9600 Baud and then use the bold poke *(65497,0)* to double the CoCo's speed. (Use *POKE65496,0* to restore normal speed.)

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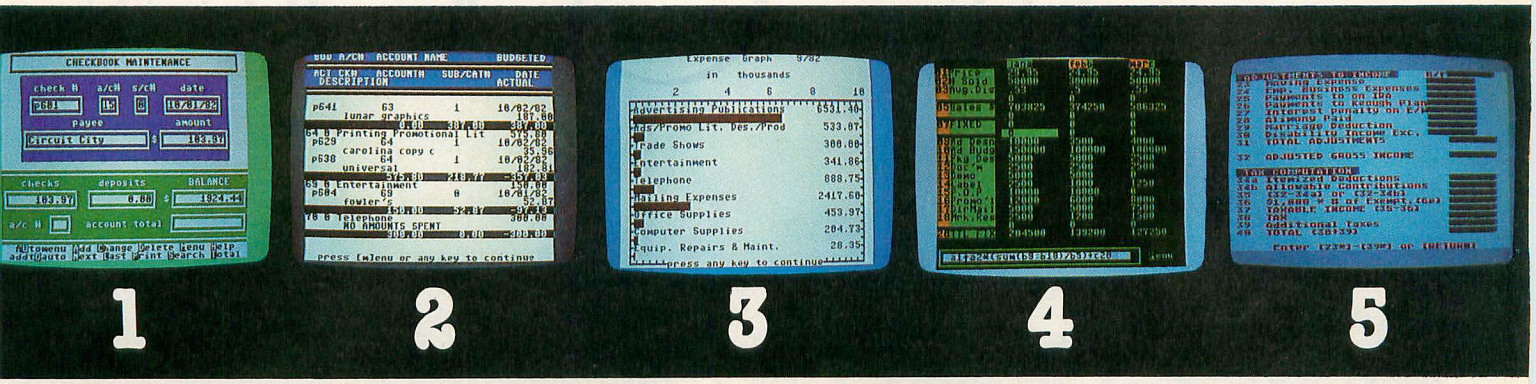

actual screen display *indicates function being shown

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Check Search
Prints Checks

*Detail Budget Analysis
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THE CROWN

OF MERRO

By Jeff Craig

I was first introduced to Adventures on the TRS-80 Model III and it wasn't until I got a CoCo, a year later, that I actually started playing Adventures. At first it was pretty confusing, but after awhile I got the hang of it and I started solving them. I thought then and I still think that Adventures are great. I'd even go as far as to say that I like Adventures better than most arcade-type games.

One day I sat down with my computer and began to make a two-word Adventure. I soon found out that it wasn't as easy as I thought! I wanted to find a way of identifying the words entered without using a whole bunch of *LEFT$* and *RIGHT$* garble. After a few days of searching and thinking, I found the long-lost *INSTR* command. With some help from my dad, who is also a CoCo enthusiast, I created a faster and shorter subroutine than other Adventures. In this program, the *INSTR* command compares the words entered with those in the program's vocabulary and converts the words into numbers. If the word is not in the vocabulary, then the number will come out as 0. Another thing that I think is pretty nifty is my scrolling routine. It's not really part of the the Adventure, but I think it adds spice. To scroll the phrase across the screen, I used *FOR* loops and *LEFT$, RIGHT$*. You can change this subroutine and use it in different programs.

As in most Adventures, *Merro* has a main objective. Your mission is to find the ancient crown of King Merro, which is hidden somewhere in the Amazon jungle. Be careful, there are many hazards to face in the jungle!

This Adventure recognizes commands such as GET, LOOK, N to go north, and even GO as in GO RIVER. The vocabulary does not contain different words that mean the same thing, such as EXAMINE and LOOK, so if one word doesn't work, try another. I have not incorporated a save feature in this game because I didn't really find it necessary, but if you find otherwise, I am sorry. I don't have any hints for you because I don't want to make it any easier for you (hee hee).

This game takes almost all of my 16K so it is necessary to type in *POKE 25,6:NEW* before you load it or finish typing it in. Also, it is necessary to unplug your disk drive when *RUNning*.

I hope you enjoy playing this game. If you require any assistance in solving it, please write: Jeff Craig, 2556 James Ave., Muskegon, Mich., 49442. Good luck!

(Jeff Craig is a sophomore and honor student at Muskegon, Michigan's, Orchard View High School. He is interested in science fiction and role playing games. In the future, he hopes to attend the Air Force Academy and major in aviation or computer science.)

Rainbow Check Plus

90 ..... 041F	80	920 ..... 1E5D	180
240 ..... 0A03	106	970 ..... 20A6	244
400 ..... 0D3D	247	1050 ..... 243C	217
450 ..... 0F5A	4	1110 ..... 26DB	35
560 ..... 12CB	155	1270 2953	203
670 ..... 158D	179	1390 ..... 2BAF	189
750 1876	89	1530 ..... 2ED6	217
830 ..... 1AED	111	END 2FF6	5

The listing:

```
1 '      THE CROWN OF MERRO
2 '            BY
3 '         JEFF CRAIG
4 '       (C) DEC.1983
5 '
10 CLS4:PRINT@7,"THE CROWN OF ME
RRO";:SCREENO,1
20 CLEAR100:DIMD(32,4),B(42),B$(
42),R$(17):R=1:P=3
30 FORY=1TO4:FORX=1TO32:READD(X,
Y):NEXTX,Y
40 DATA,1,,,24,,,,,,,32,11,12,,,1
5,16,,2,19,,23,22,4,,5,,,,,,10,,
3,,21,25,,,,30,,,,,,13,,,2,,,20,
4,22,,,,29,27,,10,,,2,19,,24,26,
,,,,,,13,14,,,,,,20,,,23,22,5,,,
,,,,10,11,,18,2,22,,,,,29,30,,,1
5,,,,,,,,4,23,22,,5,,28,,27,,,
50 FORX=1TO38:READB(X):NEXTX
60 DATA100,100,100,2,,,25,8,30,1
0,12,,28,1,29,3,20,4,5,25,26,26,
6,27,29,10,14,15,,17,,30,,11,,11
,16,16
70 FORX=1TO38:READB$(X):NEXTX
80 DATA SOME 'SUPER FLARE' MATCH
ES,SURVIVAL RATIONS,AN EMPTY CAN
TEEN,A PRIMITIVE WEAPON,A DELICI
OUS BANANA,AN * IVORY TUSK *,AN
OLD MAP,A THUUNOON EGG,A HUMAN L
IMB,A SHRUNKEN HEAD,A BRONZE TOR
CH,* MERRO'S CROWN *,A HACKSAW
90 DATATHE AMAZON RIVER,A RIVER
OF PIRANHA,MANY TREES,A HAIRY AP
E,AN ANCIENT FOUNTAIN,ELEPHANT S
KELETONS,A * LARGE RUBY *,MANY A
RMY ANTS,A BRANCHY TREE,A STURDY
 VINE,AN OLD TREE,A TALL TREE,A
GROUP OF CANNIBALS,A RUSTY GATE,
A SACRIFICIAL ALTAR
100 DATAA ROTTING SKULL,A DUSTY
COFFIN,KING MERRO,A LOG OVER A R
IVER,A LOG,AN ANCIENT STRUCTURE,
A DARK CAVE,AN EVIL EXPLORER,THI
CK WHITE WEBS,MANY BLACK WIDOW S
PIDERS
110 FORX=1TO17:READR$(X):NEXTX
120 DATASTANDING ON A SHORE,ON A
 PATH,EAST OF THE PATH,IN A SMAL
L CLEARING,IN A ELEPHANT GRAVEYA
RD,IN A BRANCHY TREE,,IN AN OLD
TREE,ON A LONG LOG,IN A SMALL VI
LLAGE,IN A CLEARING,IN A DISMAL
CAVE,IN A DAMP CAVE,IN A DREARY
ALCOVE
130 DATAIN A ERIE TEMPLE,IN A SP
OOKY CRYPT,IN MERRO'S TOMB
140 FW$="N   E   S   W   I   GO
 GET DROPSWINLOOKGIVEPUSHDRINFIL
LKILLCLIMCHOPSWIMEAT LIGHSAW BUR
NTURNOPENSAY QUIT"
150 SW$="MATCRATICANTAXE BANATUS
KMAP EGG LIMBHEADTORCCROWHACKTRE
EAPE FOUNFACENOSEWATEVINELOG CAN
NSTRUGATETEMPALTASKULPASSWEBSSPI
DCOFFMERRORRECAVESKELRIVEANTSRUB
YEXPLWEAPEYESMOUT"
160 CLS2:PRINT@1,"
                  ";
170 PRINT@64,"   THIS IS A BASIC
 TWO WORD      ADVENTURE. USE COM
MANDS SUCH AS 'KILL APE' & 'DRIN
K WATER'. IF  ONE COMMAND DOESN'
T WORK TRY    ANOTHER! USE COMMA
NDS SUCH AS   'N' TO MOVE A DIRE
CTION AND 'I' TO TAKE INVENTORY.
";
180 PRINT:PRINT"   I AM AN ENGLI
SH EXPLORER OUT TO FIND THE LOST
 CROWN OF MERRO.WHEN MY BOAT STO
PPED, MY PARTNERKNOCKED ME OUT A
ND TOOK OFF,    TAKING MOST OF M
Y EQUIPMENT. YOUMUST HELP ME FIN
D THE CROWN."
190 IFH<1THENK$="-=* THE CROWN O
F MERRO *=-     ":H=1:L$=""ELSEK$
=".....BY JEFF CRAIG.....
":H=0:L$=""
200 FORI=1TO30:L$=LEFT$(K$,I):PR
INT@31-I,L$;:IFINKEY$=""THEN210E
LSE240
210 FORTD=1TO50:NEXTTD,I:FORI=29
TOOSTEP-1:L$=RIGHT$(L$,I):PRINT@
1,L$;:IFINKEY$=""THEN220ELSEGOTO
240
220 FORTD=1TO50:NEXTTD,I:GOTO190
230 IFINKEY$=""THEN230
```

```
240 CLS3:PRINT"I AM ";
250 IFR>17THENPRINT"IN A VERY DE
NSE JUNGLE." ELSEPRINTR$(R);"."
260 PRINT"OBVIOUS EXITS:";:GOSUB
1180
270 PRINT"I SEE...":GOSUB1230
280 PRINT"*";STRING$(30,"-");"*"
290 GOSUB1260:V=0:W=0
300 IFM$=""THENV=0:GOTO340
310 V=INSTR(1,FW$,M$):V=(V+3)/4:
IFV<1THENV=0
320 IFN$=""THENW=0:GOTO340
330 W=INSTR(1,SW$,N$):W=(W+3)/4:
IFW<1THENW=0
340 IFV=0THEN1310ELSEIFV=26THENC
LS:PRINT:PRINT:PRINT:GOTO1580
350 IFQ8>0 ANDZ1<1THENQ9=Q9+1:IF
Q9>3THEN1520
360 IFV<6 AND W=0THEN1320ELSEIFV
=25 ANDR<>17THENPRINT:PRINT"OK..
.NOTHING HAPPENS.":GOTO290
370 IFV=7 ANDW=12 ANDB(12)=R THE
NGOTO1130ELSEIFV=7 ANDW=12THEN14
70ELSEIFV=10 ANDW<>0 ANDW<14 AND
B(W)<>100 AND B(W)<>R THEN1470
380 IFV=10 ANDW=0THENGOTO240ELSE
IFV=10 ANDW=11 AND(B(11)=R OR B(
11)=100)ANDQ7<1THENPRINT:PRINT"T
HE TORCH JUST LIT UP!":B$(11)="A
 LIT TORCH":Q7=1:GOTO290ELSEIFV=
10 ANDW=11 ANDQ7>0THEN1410ELSEIF
V=10 ANDW=11THEN1420
390 IFV=10 ANDW=13 ANDB(13)=100T
HENPRINT:PRINT"IT LOOKS LIKE THE
 ONE THAT WAS  STOLEN FROM ME.":
GOTO180ELSEIFV=10 ANDW=13THEN142
0
400 IFV=16 ANDB(23)=100THENPRINT
:PRINT"I CAN'T...I'VE GOT THE VI
NE!":GOTO290
410 IFV=10 ANDW=38 ANDB(20)=100T
HENPRINT:PRINT"IT'S MADE OF GLAS
S":B$(20)="A GLASS RUBY":GOTO290
ELSEIFV=10 ANDW=38THEN1420ELSEIF
V=10 ANDW=8 ANDB(8)=100THENPRINT
:PRINT"IT'S YELLOW WITH BROWN SP
OTS.":GOTO290ELSEIFV=10 ANDW=8TH
EN1420
420 IFV=10 ANDW=7 ANDB(7)=100THE
NPRINT:PRINT"IT SAYS: GO DIRECTL
Y TO JAIL,  DO NOT PASS GO, AND
 DO NOT","COLLECT $200.":GOTO290
ELSEIFV=10 ANDW=7THEN1420
430 IFV=10 ANDW=40 AND(B(4)=100
ORB(4)=R)THENPRINT:PRINT"IT'S VE
RY SIMILAR TO AN AXE.":B$(4)="A
VERY SHARP AXE":GOTO290ELSEIFV=1
0 ANDW=40THEN1470
440 IFV=7 ANDW=38 ANDB(20)=R THE
NP=P+1:IFP>3THEN1390ELSEIFV=7 AN
DW=38 ANDB(20)=R THENB(20)=100:P
RINT"OK.":IFB(12)=100THEN1130ELS
EGOTO290
450 IFW=40THENW=4
460 IFV=7 ANDW=38THEN1470
470 IFV=7 ANDN$="WATE"THENPRINT:
PRINT"TRY PUTTING IT IN SOMETHIN
G.":GOTO290ELSEIFV=7 ANDW=20 AND
B(23)=R THENP=P+1:IFP>3THEN1390E
LSEIFV=7 ANDW=20 ANDB(23)=R THEN
B(23)=100:PRINT"OK.":GOTO290
480 IFV=7 ANDW>13THEN1480
490 IFV=7 AND B(W)=R THENP=P+1:I
FW=5 THENQ3=1:GOTO1390ELSEIFP>3T
HEN1390ELSEB(W)=100:PRINT"OK.":G
OTO290
500 IFV=7 AND(W>13 AND W<>20)THE
N1450ELSEIFV=8 ANDW=20 AND B(23)
=100THENPRINT"OK.":B(23)=R:P=P-1
:GOTO290
510 IFV=8 ANDW=38 ANDB(20)=100TH
ENP=P-1:B(20)=R:GOTO290ELSEIFV=8
 ANDW=38THEN1420
520 IFV=8 AND B(W)=100 THENP=P-1
:B(W)=R:PRINT"OK.":GOTO290ELSEIF
V=8THEN1420
530 IFV=20 AND W=1 AND B(1)=100
ANDR<>10THENPRINT:PRINT"OK...THE
 MATCH LIGHTS AND FLARESBRIEFLY.
":GOTO290 ELSEIFV=20 AND W=1 AND
```


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```
B(1)<>100THEN1420
540 IFV=18THEN1430ELSEIFV=19 AND
W=5 ANDB(5)=100THENB(5)=0:P=P-1:
GOTO1440ELSEIFV=19 ANDW=9 ANDB(9
)=100THENB(9)=0:P=P-1:GOTO1440EL
SEIFV=19 ANDW=8 ANDB(8)=100THENB
(8)=0:P=P-1:GOTO1440
550 IFV=19 AND(W>0 AND W<14) AND
B(W)=100THEN1450ELSEIFV=19 AND(W
>0 AND W<14) AND B(W)<>100THEN14
20ELSEIFV=19THENPRINT:PRINT"EAT
WHAT??":GOTO290
560 IFV=17 AND B(4)<>100 THENPRI
NT:PRINT"I DON'T HAVE THE AXE.":
GOTO290
570 ON R GOTO840,840,600,670,740
,800,290,820,840,890,940,980,100
0,1020,1040,1060,1080,840,840,63
0,840,840,840,840,840,760,850,84
0,870,930,840,840
580 IFV=10THEN1410
590 GOTO1310
600 IFV=10 AND W=14 AND B(16)=3
ANDQ3<1THENPRINT:PRINT"ONE OF TH
E TREES HAS A BANANA.":B(5)=3:GO
TO290ELSEIFV=10 ANDW=14 ANDB(16)
=3THEN1410
610 IFV=17 AND W=14 AND B(16)=3T
HENB(16)=0:GOTO1490
620 IFV=10THEN1410ELSEIFV>0THEN1
480ELSEGOTO1310
630 IFV=10THEN1410
640 IFV=11 AND W=5 AND B(5)=100T
HENPRINT:PRINT"THE APE GRABBED T
HE BANANA AND  RAN OFF.":B(17)=0
:B(5)=0:D(20,4)=21:P=P-1:GOTO290
ELSEIFV=11 AND W=5THEN1420
650 IFV=15 OR V=17THENPRINT:PRIN
T"THE APE JUST MANGLED YOUR BODY
.":GOTO1570
660 IFV>0THEN1480ELSEGOTO1310
670 IFV=10 ANDW=16 ANDWW=1THENPR
INT:PRINT"IT'S BASIN IS FULL.":G
OTO290ELSEIFV=10 AND W=16 THENPR
INT:PRINT"THE FOUNTAIN IS A STAT
UE WITH A STRANGE FACE.":GOTO290
680 IFV=10 ANDW=17THENPRINT:PRIN
T"THE FACE HAS TWO BEADY EYES, A
  BIG NOSE AND AN OPEN MOUTH.":G
OTO290ELSEIFV=10 AND W=18THENPRI
NT:PRINT"IT LOOKS LIKE IT CAN BE
 MOVED.":GOTO290
690 IFV=10THEN1410ELSEIFV=12 AND
W=18 ANDWW<>1 ANDCC<>1THENPRINT:
PRINT"CRYSTAL CLEAR WATER CAME O
UT OF THE MOUTH AND INTO A BASIN
.":WW=1:GOTO290ELSEIFV=12THEN146
0
700 IFV=14 ANDW=3 ANDWW=1 ANDB(3
)=100THENPRINT:PRINT"OK...THE CA
NTEEN IS FULL.":CC=1:WW=0:B$(3)=
"A FULL CANTEEN":GOTO290ELSEIFV=
14 AND W=3 AND WW<>1THENPRINT:PR
INT"THERE IS NO MORE WATER.":GOT
O290
710 IFV=14 AND W=3 AND WW=1THENP
RINT:PRINT"I DON'T HAVE ANYTHING
 TO FILL.":GOTO290
720 IFV=13 AND W=19 AND (CC=1 OR
 WW=1)THENPRINT:PRINT"GLUB, GLUB
,,GLUB. YUMM!":CC=0:WW=0:B$(3)="
AN EMPTY CANTEEN":GOTO290
730 IFV>0THEN1480ELSEGOTO1310
740 IFV=10 ANDW=35 ANDB(6)=0THEN
PRINT:PRINT"ONE OF THE SKELETONS
 HAS AN      IVORY TUSK!":B(6)=5:
GOTO290ELSEIFV=10THEN1410
750 IFV>0THEN1480ELSEGOTO1310
760 IFV=10 ANDW=37THENPRINT:PRIN
T"THERE ARE 1,957,321 OF THE
  LITTLE SUCKERS!!":GOTO290ELSEI
FV=10THEN1410
770 IFV=15 ORV=19THEN1480
780 IFV=16 ANDW=14 ANDB(22)=R TH
ENR=6:PRINT"OK.":FORT=1TO500:NEX
TT:GOTO240ELSEIFV=16 ANDW=14THEN
1480
790 IFV>0THEN1480ELSEGOTO1310
800 IFV=10THEN1410ELSEIFV=9 ANDW
=20 ANDB(23)=100THENPRINT:PRINT"
ALL RIGHT!.....WOOOOSH...CLUNK."
:B(23)=8:P=P-1:R=8:FORT=1TO1500:
NEXTT:GOTO240ELSEIFV=9 ANDW=20TH
EN1420ELSEIFV=17 AND W=14THENB(2
2)=0:GOTO1490
810 IFV=16 ANDW=14 ANDB(22)=26TH
ENPRINT"OK.":R=26:FORT=1TO500:NE
XTT:GOTO240ELSEIFV>0THEN1480ELSE
GOTO1310
820 IFV=10THEN1410ELSEIFV=9 ANDW
=20 ANDB(23)=100THENPRINT:PRINT"
HERE I GO AGAIN.....WOOOSH...":
R=6:B(23)=6:P=P-1:FORT=1TO1500:N
EXTT:GOTO240ELSEIFV=9 ANDW=20THE
N1420
830 IFV=16 AND W=14THENPRINT"OK.
":R=27:FORT=1TO500:NEXTT:GOTO240
ELSEIFV>0THEN1480ELSEGOTO1310
840 IFV=10THEN1410ELSEIFV>0THEN1
480ELSEGOTO1310
850 IFV=10THEN1410ELSEIFV=16 AND
W=14 ANDB(24)=27THENPRINT"OK.":R
=8:FORT=1TO500:NEXTT:GOTO240
860 IFV=17 AND W=14THENB(24)=0:G
OTO1490ELSEIFV>0THEN1480ELSEGOTO
1310
870 IFV=10THEN1410ELSEIFV=6 ANDW
=36THENCLS:PRINT"THE PIRANHA ATE
 ME ALIVE...     I'M DEAD.":GOTO1
570ELSEIFV=17 ANDW=14 ANDQ4<1THE
```

```
NB$(25)="A LOG OVER A RIVER.":Q4
=1:GOTO1490ELSEIFV=17 ANDW=14 TH
EN1480
880 IFV=6 ANDW=21 ANDQ4>0THENPRI
NT"OK.":FORT=1TO500:NEXTT:R=9:GO
TO240ELSEIFV>0THEN1480ELSEGOTO13
10
890 IFV=10 ANDW=22 ANDQ5<1THENPR
INT:PRINT"THEY SEEM TO BE VERY A
NGRY!":GOTO290ELSEIFV=10 ANDW=22
THENPRINT:PRINT"THEY'RE HUDDLED
TOGETHER","STUDYING THE MATCHES.
":GOTO290ELSEIFV=10THEN1410
900 IFV=20 ANDW=1 ANDB(1)=100THE
NPRINT:PRINT"THE CANNIBALS ARE A
WED BY THE   MATCH FLAME.":Q5=1:
GOTO290ELSEIFV=20 ANDW=1THEN1420
910 IFV=11 ANDW=1 ANDB(1)=100 AN
DQ5=1THENB(1)=0:P=P-1:Q4=1:PRINT
:PRINT"THE CANNIBALS GRAB THE MA
TCHES.":B$(26)="CANNIBALS WITH M
ATCHES":D(10,1)=31:D(10,3)=32:GO
TO290ELSEIFV=11 ANDW=1 ANDB(1)=1
00THENPRINT:PRINT"THE CANNIBALS
AREN'T INTERESTED.":GOTO290
920 IFV=11 ANDW=1THEN1420ELSEIFV
>0THEN1480ELSEGOTO1310
930 IFV=10THEN1410ELSEIFV=6 ANDW
=21THENPRINT"OK.":R=9:FORT=1TO50
0:NEXTT:GOTO240ELSEIFV>0THEN1480
ELSEGOTO1310
940 IFV=10 ANDW=39 ANDQ6<1THENPR
INT:PRINT"HE LOOKS VERY GREEDY."
:GOTO290ELSEIFV=10 ANDW=23 THENP
RINT:PRINT"IT HAS A CAVE ENTRENC
E.":GOTO290ELSEIFV=10 ANDW=39THE
N1470ELSEIFV=10THEN1410
950 IFV=11 ANDW=38 ANDQ6<1 ANDB(
20)=100THENB(20)=0:P=P-1:GOTO150
0ELSEIFV=11 ANDW=38 ANDQ6<1THEN1
420ELSEIFV=11 ANDW=6 ANDQ6<1 AND
B(6)=100THENB(6)=0:P=P-1:GOTO151
0ELSEIFV=11 ANDW=6 ANDQ6<1THEN14
20
960 IFV=11 ANDQ6<1THENPRINT:PRIN
T"HE SAYS: HA! HA! YOU MUST THIN
K I'M STUPID!":GOTO290ELSEIFV=11
THENPRINT:PRINT"TO WHOM??":GOTO2
90ELSEIFV=6 AND(W=34 OR W=23)AND
Q6>0THENR=12:PRINT"OK.":FORT=1TO
500:NEXTT:GOTO240
970 IFV=6 ANDW=34THENPRINT:PRINT
"THE EXPLORER WON'T LET ME.":GOT
O290ELSEIFV>0THEN1480ELSEGOTO131
0
980 IFQ7<1THENPRINT:PRINT"THE TO
RCH JUST LIT UP!":B$(11)="A LIT
TORCH":Q7=1:GOTO290
990 IFV=10THEN1410ELSEIFV>0THEN1
480ELSEGOTO1310
1000 IFQ8<1THENCLS4:PRINT"AAAARG
H!! A SPEAR TRAP!","THE SPEAR WA
S COATED WITH DEADLYKATOOMO POIS
ON! I'LL BE DEAD IN A MATTER OF
SECONDS!":Q8=1:GOTO290
1010 IFV=13 ANDW=19 ANDCC=1 ANDB
(3)=100THENZ1=1:CC=0:B$(3)="AN E
MPTY CANTEEN":PRINT:PRINT"AAAAAH
! THE ANTIDOTE!":GOTO290ELSEIFV=
13 ANDW=19THEN1420ELSEIFV=10THEN
1410ELSEIFV>0THEN240ELSEGOTO1310
1020 IFV=3THEN240ELSEIFZ2<1THENC
LS4:PRINT"A LARGE GATE JUST FELL
 AND       BLOCKED THE ONLY EXIT!
":Z2=1:B(27)=14:GOTO290ELSEIFV=1
0THEN1410
1030 IFV=21 ANDW=24 ANDB(13)=100
 ANDZ3<1THENPRINT"OK...I SAWED T
HROUGH.":B(27)=0:D(14,1)=13:Z3=1
:GOTO290ELSEIFV=21 ANDW=13 ANDB(
13)<>100THEN1530ELSEIFV=21 ANDW=
13 ANDZ3>0THEN1470ELSEIFV>0THEN1
480ELSEGOTO1310
1040 IFV=10 ANDW=26THENPRINT:PRI
NT"IT HAS A SKULL ON IT.":B(29)=
15:GOTO290ELSEIFV=10 ANDW=27THEN
PRINT:PRINT"THE SKULL HAS THE WO
RD -","(ORREMKNIG) ON IT'S FOREH
EAD.":GOTO290ELSEIFV=10THEN1410
1050 IFV=23 ANDW=27THENPRINT:PRI
NT"OK...THE WALL OPENS UP","REVE
ALING A PASSAGE.":D(15,3)=16:GOT
O290ELSEIFV>0THEN1480ELSEGOTO131
0
1060 IFV=10THEN1410ELSEIF(V=6 OR
V=15 ORV=17)AND(W=29 ORW=30)THEN
1450ELSEIFV=22 ANDW=29 ANDB(11)=
100 ANDZ4<1THENPRINT:PRINT"THE W
EBS BURN AWAY AND THE","SPIDERS
DISAPPEAR!":B(37)=0:B(38)=0:D(16
,3)=17:Z4=1:GOTO290ELSEIFV=22 AN
DW=29 ANDB(11)<>=100THEN1540
1070 IFV=22 ANDW=29 ANDZ4>0THEN1
470ELSEIFV>0THEN1480ELSEGOTO1310
1080 IFV=10 ANDW=31 ANDZ5<1 THEN
PRINT:PRINT"IT'S CLOSED.":GOTO29
0ELSEIFV=10 ANDW=31THENPRINT:PRI
NT"IT'S OPEN.":GOTO290ELSEIFV=10
 ANDW=32 ANDZ5>0THENPRINT:PRINT"
HE LOOKS VERY MEAN AND HE'S
WEARING A CROWN.":GOTO290ELSEIFV
=10 ANDW=32THEN1470
1090 IFV=10THEN1410
1100 IFV=24 ANDW=31 ANDZ5<1THENP
RINT"OK.":PRINT"OH, OOH...THE GH
OST OF KING      MERRO JUST JUMPE
D OUT!":B(31)=R:Z5=1:GOTO290ELSE
IF(V=15 ORV=22 ORV=17) ANDW=32TH
EN1560
1110 IFV=25 ANDW=33 ANDZ5>0THENF
```

```
ORT=1TO19:CLS0:FORCV=1TO10:NEXTC
V:CLS5:FORCV=1TO10:NEXTCV:NEXTT:
B(31)=0:B(12)=17:GOTO240
1120 IFV=25 ANDW=33THEN1460ELSEI
FV>0THEN1480ELSEGOTO1310
1130 CLS:PRINT:PRINT"YOU HAVE WO
N THIS ADVENTURE...  GOOD GOING!
 I HOPE YOU ENJOYED  IT.":IFB(6)
=100 OR B(6)=R THENK=2
1140 IFK<1THENK=1
1150 PRINT:PRINT"YOU FINISHED WI
TH ";K;" OUT OF TWOTREASURES.":P
RINT@426,"TAP ANY KEY.":SCREEN0,
1
1160 IFINKEY$=""THEN1160ELSECLS:
END
1170 GOTO290
1180 IFD(R,1)<>0THENPRINT" NORTH
";
1190 IFD(R,2)<>0THENPRINT" EAST"
;
1200 IFD(R,3)<>0THENPRINT" SOUTH
";
1210 IFD(R,4)<>0THENPRINT" WEST"
;
1220 PRINT:RETURN
1230 FORX=1TO39:IFB(X)=R THENPRI
NTB$(X):Q1=1
1240 NEXTX:IFQ1<1THENPRINT"NOTH
NG OF INTEREST."
1250 Q1=0:RETURN
1260 M$="":N$="":INPUT"WHAT SHOU
LD I DO";M$:IFLEN(M$)<4THENFORX=
1TO(4-LEN(M$)):M$=M$+" ":NEXTX
1270 FORX=1TOLEN(M$):IFMID$(M$,X
,1)=" "ANDLEN(M$)>(X+2)THENN$=MI
D$(M$,X+1,4):IFLEN(N$)<4THENN$=N
$+" ":GOTO1290ELSEGOTO1290
1280 NEXTX
1290 IFLEFT$(M$,3)="GO "THENM$="
GO  ":RETURN
1300 M$=LEFT$(M$,4):RETURN
1310 PRINT:PRINT"I'M SORRY. I DO
N'T UNDERSTAND.":GOTO290
1320 IFV=1ANDD(R,1)<>0THENR=D(R,
1)ELSEIFV=2ANDD(R,2)<>0THENR=D(R
,2)ELSEIFV=3ANDD(R,3)<>0THENR=D(
R,3)ELSEIFV=4ANDD(R,4)<>0THENR=D
(R,4)ELSEIFV=5THEN1340ELSEPRINT:
PRINT"USE YOUR HEAD...","YOU CAN
'T GO THAT WAY!":GOTO290
1330 IFR=13THEN1000ELSEIFR=14THE
N1020ELSEGOTO240
1340 CLS4:PRINT"YOU HAVE IN YOUR
 POSSESSION:":IFB(23)=100THENPRI
NT:PRINTB$(23):Q2=1ELSEPRINT
1350 FORX=1TO20:IFB(X)=100THENPR
INTB$(X):Q2=1
1360 NEXTX:IFQ2<1THENPRINT:PRINT
"NOTHING AT ALL."
1370 PRINT@426,"TAP ANY KEY.";:Q
2=0:SCREEN0,1
1380 IFINKEY$=""THEN1380ELSE240
1390 IFP>3THENPRINT:PRINT"YOU'RE
 CARRYING TOO MUCH. TAKE  (I)NVE
NTORY.":P=P-1:GOTO290ELSEIFW=12T
HEN1400ELSEB(W)=100:PRINT"OK.":G
OTO290
1400 ' INPUT RESPONSES
1410 PRINT:PRINT"I SEE NOTHING S
PECIAL.":GOTO290
1420 PRINT:PRINT"I DON'T HAVE IT
.":GOTO290
1430 PRINT:PRINT"I DON'T KNOW HO
W TO SWIM.":GOTO290
1440 PRINT:PRINT"MMMMMM...THAT T
ASTED GOOD!":GOTO290
1450 PRINT:PRINT"I CAN'T DO THAT
...I'LL BREAK A  TOOTH!":GOTO290
1460 PRINT:PRINT"OK...NOTHING HA
PPENS.":GOTO290
1470 PRINT:PRINT"I DON'T SEE IT
HERE.":GOTO290
1480 PRINT:PRINT"I'M SORRY, BUT
I CAN'T DO THAT.":GOTO290
1490 PRINT:PRINT"OK!..CHOP...CHO
P...CHOP...CHOP..KKKRT...TIMBER!
":GOTO290
1500 PRINT:PRINT"THE EVIL EXPLOR
ER TOOK THE RUBY AND RAN INTO TH
E JUNGLE. AS HE  RAN HE SAID: SO
 LONG SUCKER!":Q6=1:B(36)=0:GOTO
290
1510 PRINT:PRINT"THE EVIL EXPLOR
ER TOOK THE TUSK AND SAID: THIS
TUSK WILL EARN MEA FORTUNE, UNLI
KE THAT GLASS    RUBY YOU HAVE!"
:Q6=1:B(36)=0:GOTO290
1520 CLS:PRINT:PRINT"THE POISON
SWIFTLY TRAVELED MY  BLOOD STREA
M TO YOUR HEART...    I AM DEAD."
:GOTO1570
1530 PRINT:PRINT"I DON'T HAVE TH
E HACKSAW.":GOTO290
1540 PRINT:PRINT"I DON'T HAVE AN
Y FIRE!!":GOTO290
1550 CLS:PRINT:PRINT"THE SPIDERS
 SWARMED OVER ME...  I AM DEAD."
:GOTO1570
1560 CLS:PRINT:PRINT"THE GHOST O
F KING MERRO NOW HAS MY HEAD AS
A COFFIN ORNAMENT..I AM DEAD.":G
OTO1570
1570 PRINT:PRINT"SORRY SUCKER...
   "
1580 PRINT"PLAY AGAIN (Y/N)?";:S
CREEN0,1
1590 A$=INKEY$:IFA$=""THEN1590EL
SEIFA$="Y"THENRUNELSECLS:END
```

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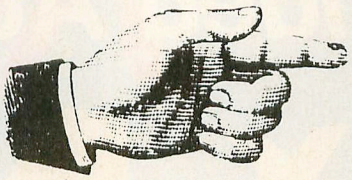

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Creating the Well-Blended Adventure

By Eric W. Tilenius

Are you tired of trying to write "Munch Man" in BASIC and having it turn out as "Mush Man"? Turn your creativity to something more rewarding—creating *ADVENTURES.*

This article will show you how you can design your own Adventures in BASIC. As an example, a *Miniventure* will be built step-by-step. I call it a Miniventure since it is very small (9 rooms), but contains all the elements you find in most larger adventures.

With a good imagination and your trusty Color Computer, you will soon be on the road to . . . Adventures!

The first step in creating an Adventure program is to come up with a scenario, or setting, for the Adventure. The scenario should give a background to the Adventure as well as provide the Adventurer with a main goal to accomplish. Some examples of scenarios are:

- The Adventurer is trapped in an old haunted house. He must search for a lost treasure and find a way out, while avoiding the ghosts, monsters, and other assorted hazards that await him within.

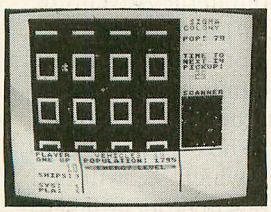
- The Adventurer is on an intergalactic spaceship when it is attacked by hostile enemies. He takes a small shuttlecraft and flees from the ship just before it is destroyed by the enemy. The shuttlecraft, however, runs out of fuel before it can get him to the nearby space station. It crash lands on a nearby planet and is almost totally destroyed by the crash. The Adventurer must now deal with possibly hostile aliens and the many other dangers of the alien environment and try to get off the planet and back to the space station.

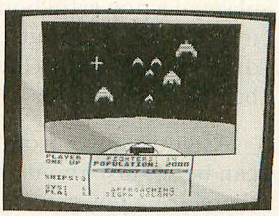
- The player lives in a realm of magic and sorcery. He must defeat enemy wizards, battle fierce dragons, and outwit many other creatures in an attempt to rescue a captive princess.

(Eric W. Tilenius is a sophomore at Walt Whitman High School and has been programming and working with computers for several years. He is currently serving as an advisor and consultant to people new to the computer field. During his freshman year, Eric was editor of The Stinson Stylus, a school newspaper.)

INTERCEPT 4

By J. Weaver, Jr.





Your ship and the planet are under attack. Hostile alien craft whip around the ship, releasing flamming bolts of energy upon the hull of the INTERCEPT. Immediately your own guns come alive, warding off the sudden attackers, but will it be enough? Already many of the fighters have escaped past your ship toward the defenseless colonies below. Once the air battle is over, you must transport down to the planet, try to find the alien foe, and destroy them. Then, the hardest task awaits: Using the full power of the INTERCEPT, you must battle and destroy the mother ship!! Three separate screens or levels of play. Each screen scrolls in all four directions. A fantastic new game by the author of Outhouse. Requires two joysticks. 32K..... $27.95/29.95

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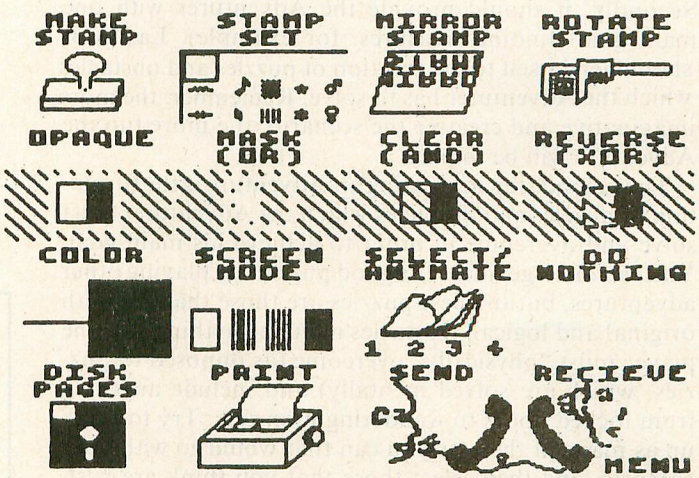

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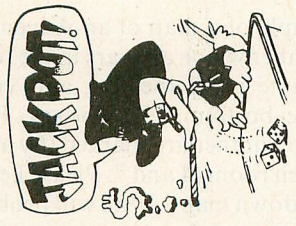

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• The player is a private detective who one day receives an anonymous phone call saying that terrorists have planted a powerful bomb in the center of L.A. He tries to tell the police about this but no one listens. He must discover the bomb's location on his own and deactivate it before it is too late.

As you can see from the examples above, the scenario can be set just about anywhere — real or fictional — but there are a few general rules which should be applied in creating a scenario. First of all, it should be large enough to give the player plenty of room to move about. An Adventure set in Joe's Auto Garage just won't work. Secondly, it should provide the Adventurer with one main goal (finding treasures, for example). Lastly, it should lend itself to the creation of puzzles and obstacles which the Adventurer has to solve. Remember: the more imaginative and creative the scenario, the more fun the Adventure will be to play.

The second step in creating an Adventure is the formation of puzzles and obstacles which the Adventurer must solve and overcome in order to achieve his main goal. You can often get ideas for good puzzles by playing other adventures, but the best puzzles are those that are both original and logical. Obstacles include anything that the player must "physically" overcome (as opposed to puzzles, which are solved mentally) and include anything from locked doors to wandering monsters. Try to think up as many of these as you can that would go with your scenario, and then select those that you think are best. For example, if your scenario was similar to the one with the spaceship above, you might think up some puzzles and obstacles such as these:

• Aliens surround the Adventurer and gesture menacingly at him. He must get past them somehow without arousing their anger.

• The Adventurer must obtain a golden disk in order to enter the walled city of the ancients.

• Once inside the city of the ancients, he must decipher the old scrolls of knowledge which tell where things that he needs are hidden.

MAPPING IT OUT

Up to now, all you have done is to think about what your scenario would be, and what puzzles and obstacles you could use in such a scenario. Now, however, we begin the "drawing up" of the main part of the Adventure itself.

An Adventure is divided into many locations called rooms. A room can be anything from a closet to a forest. It may have one or more objects in it and may have exits in any of four directions — north, south, east, or west. (Some adventures use up and down also.) When the player enters a room, the computer tells him the above information. Here is an example:

YOU ARE IN A SMALL ALCOVE
YOU SEE: HAMMER SHOVEL
OBVIOUS EXITS LEAD: EAST WEST

What you have to do now is to create and map out rooms in your Adventure. Take a large piece of paper and draw boxes on it — as many boxes as there are rooms in your Adventure. If you are not sure how many rooms you will have, start with several boxes and leave room to add on. Each box will represent one room in the Adventure. Now, number each box starting with #1 then 2 then 3, etc. . . . Do not skip numbers! It does not matter what box gets what number, or even if the numbers are in order —only that each box has its own number. It is a good idea to put each number in a corner of the box so that there is room in the box for other things which we will add shortly. Each room in the Adventure will be identified to the computer by the number which you have put in the box.

Now give each room a name and list what, if any, objects are in it. You must also indicate the exits using the following procedure:

1. Connect "rooms" (boxes) that lead to one another by drawing a line from one to another.
2. If one room leads to another but is blocked (by a door, for example), draw a line but mark on that line whatever is blocking it.

If you are a little confused, see Diagram 1. It should help to clear things up.

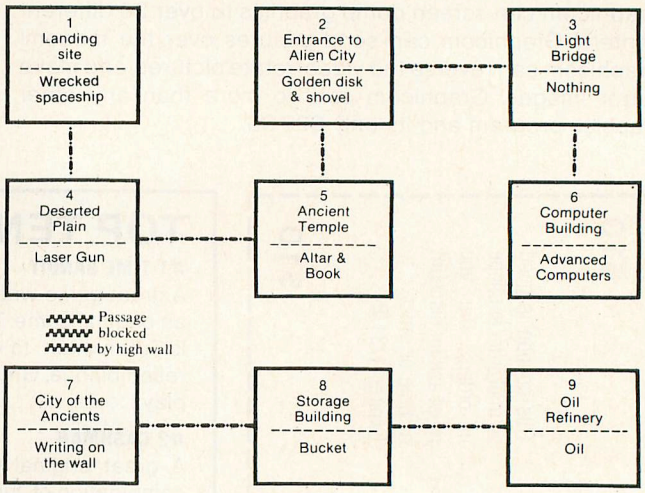


DIAGRAM 1: An example of a map of an Adventure. Each room is given a number which appears in the top of each box. The room name is on the top, and visible objects are listed on the bottom of the boxes. Paths leading from one room to another are marked (by an ➖). Note the blockage between rooms 4 and 7. Please keep in mind that this is a scaled down map — you will probably have more rooms than this.

Try to incorporate the puzzles and obstacles which you have thought up into the map. For example, in the sample map, the Adventurer must find a way to get over the high wall. Also, in order to get the oil, he must first get the bucket.

Once you have done this and completed your map, you are ready to . . .

START PROGRAMMING

So far, your CoCo might have just as well been a flower stand. We haven't even touched it! But now let's change all that. Put your map down by your computer, power it up, and get ready to *go*!

The first step is to get CoCo to remember a "map" of your Adventure. This is done by putting it into *DATA* statements and then reading it into ARRAYS. (In case you're a little rusty on your arrays, see chapters 20 & 21 in "Getting Started with Color BASIC." To review *READ* and *DATA* see Pages 94—100 & 127 in the same book.)

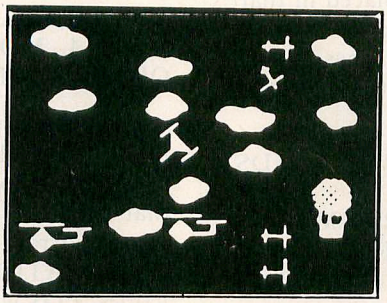
Start your program at about line 100. Type in the room names as DATA, going in order according to the room numbers. So, for the map above, you would type:

100 DATA LANDING SITE, ENTRANCE TO ALIEN CITY, LIGHTBRIDGE,DESERTED PLAIN,ANCIENT TEMPLE, COMPUTER BUILDING,CITY OF THE ANCIENTS,STORAGE BUILDING, OIL REFINERY

You will probably need more than one program line to do this. Next, type in the data for the objects using this format: LONG OBJECT NAME, SHORT OBJECT NAME, ROOM where object is at start of the Adventure. The long object name is a description of the object, such as is on the map. The short object name is one word which the person can use if he wants to TAKE the object. (For example, to take the golden disk, a person would say "TAKE DISK".) If the object can not be taken (a spaceship, for instance) type an * instead of a short object name. For the objects on the sample map, you would type in:

200 DATA WRECKED SPACE SHIP , *, 1, GOLDEN DISK, DISK,2,,ALTAR,*,5, BOOK, BOOK,5, LASER GUN, GUN,4, ADVANCED COMPUTERS,*, 6,OIL,* ,9,BUCKET,8,WRITING ON THE WALL,*,7

The next step is to create what is known as a travel table. The travel table tells what room the player will be in if he moves in one of the four directions. Its format is: NORTH,SOUTH,EAST,WEST—each of which represents the number of the room the player would get to if he moved in that direction. If the player cannot move in a certain direction, a zero (0) would



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By Tim Purves

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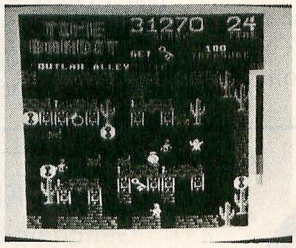
TIME BANDIT

This month is the first month that the entire top ten panel had copies of Time Bandit and they overwhelmingly voted it into first place. Never before has a game received so many first place votes. At the Dallas Rainbowfest and at the Pasadena Color Expo, arcade players were unanimous in the praise of Time Bandit. "The best original game ever written for the COCO"' ... "My dad said I could buy only one game and this is the best game here" ... "Best game at the show" ... "Best game I've ever seen on a home computer" ... "Great Game" ... Only game I bought at the show" ... *These* are comments we heard about Time Bandit at these two shows ... I can say without a doubt that TIME BANDIT is the best game on the market for the COCO.



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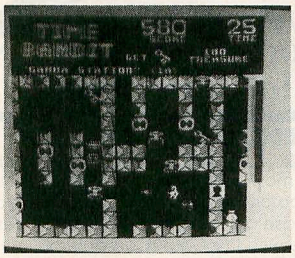

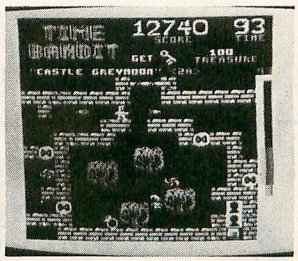

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be placed under that direction. If the Adventurer dies by going in that direction, a 1000 would be placed in that direction. If the direction is blocked, a negative number would be placed for that direction. Each room has its own data entry for this, as seen in the travel table for the sample map listed below:

```
300 DATA 0,4,0,0 :REM GOING SOUTH LEADS TO ROOM 4
310 DATA 0,5,3,0 :REM DATA FOR ROOM #2
320 DATA 0,6,0,2, :REM DATA FOR ROOM #3
330 DATA 1,-1,5,0:REM PASSAGE SOUTH IS BLOCKED
340 DATA 2,0,0,4
350 DATA 3,0,0,0
360 DATA -1,0,8,0:REM PASSAGE NORTH BLOCKED
370 DATA 0,0,9,7
380 DATA 0,0,0,8
```

You can make up a list of obstructions and create a value for each. For example: -1 if a wall is blocking the way, -2 if a door is in the way, -3 if a monster blocks the way, etc. . . .

Next, type in the commands (verbs) which you wish your Adventure to recognize. Next to each verb, place a VERB NUMBER. If two verbs are the same (e.g. GET and TAKE) place the same number for each. Use low numbers as it will make things easier for you. These numbers will be used to identify the verbs later on. A common verb listing is:

```
400 DATA TAKE,1,GET ,1, DROP, 2, GO,3, LOOK,4, READ,4, MOVE,5, PUSH,5, PULL,5, UNLOCK,6, OPEN,7, INVENTORY,8
```

Now that you have all your data statements in, we can proceed with the rest of the program. The next thing we are going to do is to READ all of the data into arrays so that we can use it during the game. First we must DIMension the arrays which we will be using. L$ will stand for the LOCATION and will be used to hold the room names. LO$ will be used for LONG OBJECT descriptions, O$ for the short OBJECT names, and O for the room the object is in. C$ will be for the COMMANDS, and C for the COMMAND numbers. T will be a two dimensional array in which the TRAVEL table will be stored. DIMension them at the start of the program by typing:

```
10 DIM L$(X+1),LO$(Y+1)O$(Y+1),C$(20),T(4,X),C(20)
```

Replace X in the above statement with the number of rooms you have and replace Y with the number of objects you have. DIMensioning the variables to X+1 and Y+1 leaves room to add objects in later.

Now we can read the data . . . To read the rooms, type: `600 FOR C=1 TO X:READ L$(C):NEXT C`. Simple enough? Just remember to replace X with the number of rooms that you have.

Now for the objects. Type the following, replacing Y

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with the number of objects in your Adventure. 700 FOR C=1 TO Y:READ LO$(C),O(C):NEXT C

This will put all the objects in their place. Now for the travel table. (Remember: X=# of rooms.)

```
800 FOR C=1 TO X:READ
T(1,C),T(2,C),T(3,C),T(4,C):
NEXT C
```

This will store the values of the travel table where T(1,C) is North for room C, T(2,C) is South for room C, etc. . . .

Tell CoCo what each column in the travel table relates to by entering this line:

```
850 T$(1)="NORTH" :T$(2) =
"SOUTH": T$(3)= "EAST":T$
(4)="WEST"
```

Finally, let's string up the commands and command numbers. Count up how many commands you have and replace N in the statement below with that number.

```
900 FOR C=1 TO N:READ
C$(C),C(C):NEXT C
```

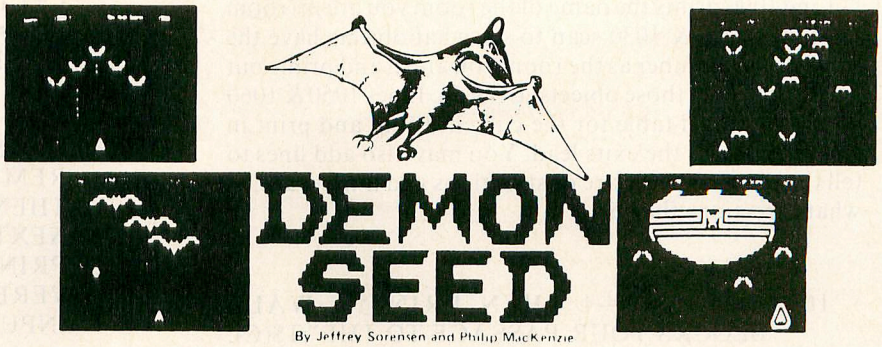
Now that you have taken care of all your *DATA*, tell the computer what room the player will start off in by typing: 950 L=R. Replace R with a room number.

YOU DID IT. All the data is now ready to be used.

MAKE IT WORK

Data is no good if it is not used, so let's proceed to use it. The first thing the adventure should do is tell the player about his surroundings: the room he is in, visible objects, and visible exits. This is accomplished by these lines. Substitute the number of rooms you have for Y.

```
1000 PRINT "YOU ARE AT
     THE ";L$(L)
1010 PRINT"YOU SEE:";
1020 FOR C=1 TO Y:IF O(C)
     =L THEN PRINT LO$
     (C);" ";
1030 NEXT C
1040 PRINT"OBVIOUS EX-
     ITS LEAD:";
1050 FOR C=1 TO 4:IF T(C,L)
     >0 THEN PRINT T$(C);
     " ";
1060 NEXT C
```

By Jeffrey Sorensen and Philip MacKenzie

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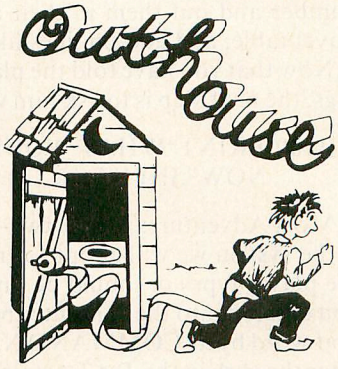
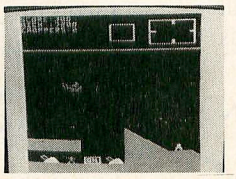
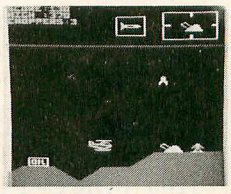


CHOPPER STRIKE





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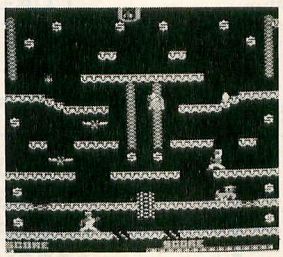
CASHMAN

By Doug Frayer and Bill Dunlevy



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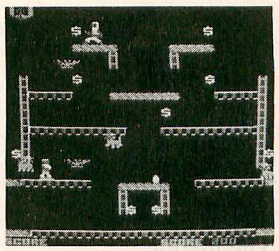

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Line 1000 prints the name of the room you are in (room L). Lines 1020 & 1030 scan to see what objects have the same object number as the room you are in and prints out a description of those objects, LO$(C). Lines 1050 & 1060 check the *travel table* for the current room and print in what directions the exits lead. You may also add lines to tell the player if there are obstructions and if there are, in what directions they lie.

```
1054 IF T(C,L)=-1 THEN PRINT"A WALL
     BLOCKS YOUR PASSAGE TO THE";T$(C);
     ".";
1056 IF T(C,L)=-2 THEN PRINT"A DOOR PRE-
     VENTS YOU FROM GOING";T$(C);".";
```

If you have more obstacles, assign them a negative number and put them in their appropriate place in the travel table, and add on lines like the ones above.

Now that you have told the player about his surroundings, the next step is to ask him what he would like to do.

```
1100 PRINT"WHAT WOULD YOU LIKE TO DO
     NOW":INPUT A$
```

Most Adventures use the two-word commands, so that is the system we will adopt for now. The first word that the player types in should be one of the commands that you entered into the computer before. If so, we represent that word by its COMMAND NUMBER which you type after the verb in the *DATA* statement. If the first word in the player's command is not in the command list, we will tell the computer to print a message saying so. This procedure is listed below.

```
1199 REM FIND THE FIRST WORD TYPED IN
     (UP TO THE SPACE) AND CALL IT A1$
1200 FOR C=1 TO LEN(A$):IF MID$(A$,C,1)=" "
     THEN (A1$)=LEFT$(A$,C-1): B$=MID$*A$,
     C+1,LEN(A$)-C): GOTO 1230 ELSE NEXT
1210 A1$=A$:REM ONE WORD COMMAND
     SUCH AS LOOK
1230 FOR C=1 TO N :REM N = NUMBER OF
     COMMANDS YOU HAVE IN VERB LIST
1240 IF C$(C)=A1$ THEN A=C(C):GOTO 1400:
     REM IF VERB IS IN COMMAND LIST
     THEN GOTO 1400
1250 NEXT C
1260 PRINT" I DO NOT UNDERSTAND THE
     VERB":GOTO 1100: REM GO BACK TO
     INPUT STATEMENT
```

That, long as it may seem, is one of the fastest ways to sort through a command input. The verb which the player typed in is known to the computer by its verb number (stored as A) and if the player typed in two words, such as GO SOUTH, the second word is stored as B$. Line 1200 takes care of dividing A$ into A1$ and B$. Lines 1230-1250 check to see if A1$ is a recognized command.

What good is all that? Well, now that we have torn A$ to bits and pieces, we can begin doing all sorts of things such as . . .

MOVING AROUND

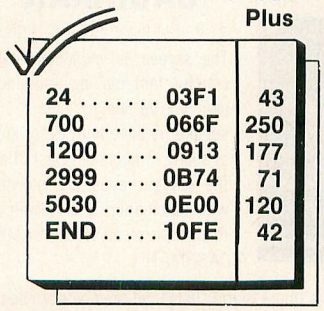
Now we tell the computer to *GOTO* various sections of the program depending upon what command was typed. Using the command *ON. . . GOTO* is the simplest way to accomplish this.

```
1400 ON A GOTO 2000,3000,4000,5000,6000,7000,
     8000,9000
```

This will send the program to line 2000 for verb #1 (GET or TAKE), line 3000 for verb #2 (DROP), line 4000 for verb #3 (GO), etc. . .

To get things moving, let's start with the routine for GO at line 4000.

Rainbow Check Plus



The listing:

```
0 'LISTING #1
1 REM MINIVENTURE BY ERIC W.
  TILENIUS
2 ' TO DEMONSTRATE ADVENTURE PRO
GRAMMING TECHNIQUES
3 ' REQUIRES 16K COLOR BASIC.
    CAN BE FIT INTO 4K BASIC
    IF ALL REMARKS AND SPACES
    ARE DELETED AND IF THE
    TITLE DESPLAY IS LEFT OUT.
4 ' DIMENSION ARRAYS USED:
    L$=ROOM NAMES
    LO$=LONG OBJECT DESCRIPTION
    O$= SHORT OBJECT NAME
    C$= COMMAND ARRAY
    C()=COMMAND NUMBERS
    T=2-D ARRAY FOR TRAVEL TABLE
    T$=DIRECTIONS
5 ' O=OBJECT ROOM NUMBER
6 'DESIGNED TO BE USED WITH
  ACCOMPANYING TUTORIAL
7 X=9 :'CHANGE TO NUMBER OF ROOM
S
8 Y=9:'CHANGE TO # OF OBJECTS
10 DIM L$(X+1),LO$(Y+1),O$(Y+1),
C$(20),T(4,X),C(20),O(Y+1)
20 'TITLE & INSTRUCTIONS
22 CLS3:PRINT"   MINIVENTURE"
24 PRINT@128,"DESIGNED TO BE USE
D WITH        ACCOMPANYING TUTOR
IAL.          THIS MINIVENTURE H
AS 9 ROOMS AND10 OBJECTS ONLY.TH
```

CIII

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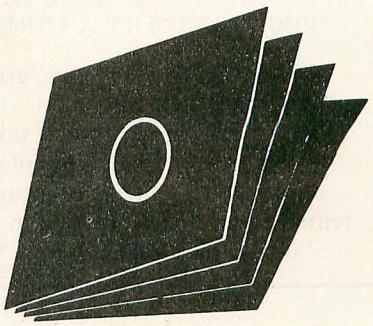

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If the person typed GO, B$ (his second word) should be a direction (e.g. GO NORTH). Let's get oriented and take care of the directions. Remember: T$(1)="NORTH",T$(2)="SOUTH", etc.

```
4000 FOR C=1 TO 4:IF B$=T$(C) THEN DR=C: GOTO 4020 :REM DR=THE DIRECTION # (1-4)
4010 NEXT C: GOTO 4050 :REM NO DIRECTION INDICATED
4020 IF T(DR,L)>0 THEN L=T(DR,L): GOTO 4030 :'IF DIRECTION IS NOT BLOCKED THEN MOVE PLAYER TO NEXT ROOM AS INDICATED BY THE TRAVEL TABLE
4025 IF T(DR,L)=<0 THEN PRINT"CAN'T GO THAT WAY.":GOTO 1100
4030 IF L=1000 THEN PRINT"YOU JUST DIED." :END:REM IF YOU DIE BY GOING IN THAT DIRECTION (OFF A CLIFF, FOR EXAMPLE) THEN END GAME
4040 GOTO 1000 :REM DESCRIBE ROOM
4050 PRINT"TRY A DIRECTION":GOTO 1100
```

Now the player can move around the setting. Try it.

Someone once said that you only *GET* what you *TAKE*. So get ready for the take routine.

There are two main types of objects in and Adventure — those which you can take, and those you can't. If you remember, when you typed in your data, you indicated the "untakable" objects with a *. The takable objects, on

```
E OBJECT IS TOBRING THE OIL BACK
 TO YOUR SPACESHIP WHICH HAS CRA
SHED ON AN    ALIEN PLANET"
65 FOR C=1 TO 7000:NEXT
100 DATA LANDING SITE,ENTRANCE T
O ALIEN CITY,LIGHT BRIDGE,DESERT
ED PLAIN,ANCIENT TEMPLE,COMPUTER
 BUILDING,CITY OF THE ANCIENTS,S
TORAGE BUILDING,OIL REFINERY
200 DATA WRECKED SPACESHIP,*,1,G
OLDEN DISK,DISK,2,ALTAR,*,5,BOOK
,BOOK,5,LASER GUN,GUN,4,ADVANCED
 COMPUTERS,*,6,OIL,*,9,BUCKET,BU
CKET,8,WRITING ON THE WALL,*,7
300 DATA 0,4,0,0
310 DATA 0,5,3,0
320 DATA 0,6,0,2
330 DATA 1,-1,5,0
340 DATA 2,0,0,4
350 DATA 3,0,0,0
360 DATA-1,0,8,0
370 DATA 0,0,9,7
380 DATA 0,0,0,8
400 DATA "TAKE",1,"GET",1,"DROP"
,2,"GO",3,"LOOK",4,"READ",4,"MOV
E",5,"PUSH",5,"PULL",5,"UNLOCK",
```


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```
6,"OPEN",7,"INVENTORY",8
600 FOR C=1 TO X:READ L$(C):NEXT
C
700 FOR C=1 TO Y:READ LO$(C),O$(
C),O(C):NEXT C
800 FOR C=1TOX:READ T(1,C),T(2,C
),T(3,C),T(4,C):NEXTC
850 T$(1)="NORTH":T$(2)="SOUTH":
T$(3)="EAST":T$(4)="WEST"
899 N=12:'CHANGE TO # OF VERBS I
N COMMAND LIST
900 FOR C=1 TO N:READ C$(C),C(C)
:NEXT C
950 L=1 :'ROOM TO START AT
999 CLS
1000 PRINT:PRINT"YOU ARE AT THE
";L$(L)
1010 PRINT"YOU SEE:";
1020 FOR C=1 TO Y:IF O(C)=L THEN
 PRINT LO$(C);"  ";
1030 NEXT C
1035 PRINT
1040 PRINT "OBVIOUS EXITS LEAD:"
;
1050 FOR C=1 TO 4:IF T(C,L)>0 TH
EN PRINT T$(C);"  ";
1060 NEXT C
```

the other hand were given a one word name. The TAKE routine listed below checks for that name and also checks if the object is in the same room as you are. If so, the player may take the object. If an object is taken, its OBJECT VALUE, O(C), is changed to 1000.

```
2000 FOR C=1 TO Y:REM Y= # OF OBJECTS IN
     ADVENTURE
2010 IF B$=O$(C) AND O(C)=L AND O$(C)<>"*"
     THEN O(C)=1000:PRINTLO$(C)" HAS BEEN
     TAKEN.":GOTO 1100:'PLAYER TAKES OB-
     JECT
2020 NEXT C
2050 PRINT"SORRY, THAT IS NOT FOR THE
     TAKING": GOTO 1100
```

That takes care of that. If, however, you have special cases, such as where you must take oil in a bucket, you can add them in in this fashion.

```
2030 IF B$="OIL" THEN GOTO 2060
2060 IF O(7)=L THEN INPUT"WITH WHAT";I$:IF
     I$="BUCKET"AND O(8)=1000 THEN O(7)=
     1000:PRINT"TAKEN":GOTO 1100
2062 PRINT"SORRY, YOU ARE UNABLE TO
     TAKE THE OIL"
```

O(7) is the object number for oil and O(8) is the object number for the bucket. You can determine these by counting the place it is in in the object data (without counting numbers or long object descriptions).

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TAKING INVENTORY

Now that the player can take things, he or she might want to get a list of things being carried. This is done by typing INVENTORY. Here is the "INVENTORY ROUTINE." *It scans the list* of object numbers and when it finds one equal to 1000 it prints that you have taken that object.

```
9000 CLS:PRINT"YOU ARE CARRYING THE
     FOLLOWING:"
9010 FOR C=1 TO Y:REM Y= # OF OBJECTS
     YOU HAVE
9020 IF O(C)=1000 THEN PRINT LO$(C)
9030 NEXT C:GOTO 1100
```

Too bad small shopkeepers don't have it this easy.

No Adventurer likes to carry around an armload of junk, so he may want to get rid of unwanted objects or objects that he no longer has use for. This procedure is naturally enough called . . .

DROPPING OBJECTS

The drop routine, located at line 3000, checks to see if the player has the object he wants to drop and, if he does, it puts it in the room he is in by changing its object number to the room number.

```
3000 FOR C=1 TO Y:'# OF OBJECTS
3010 IF B$=O$(C) AND O(C)=1000 THEN O(C)=L:-
     PRINT LO$(C)" HAS BEEN DROPPED.":
     GOTO 1100
3020 NEXT C
3030 PRINT"SORRY, YOU ARE NOT CARRY-
     ING "B$:GOTO 1100
```

Now that the player can drop and take objects, he also might like to LOOK or READ the objects he has, or might just like . . .

LOOKING AROUND

The LOOK and READ subroutine is different from the rest in that each item requires a separate entry. Look at the example below.

```
5000 'LOOK ROUTINE. B$= WORD FOLLOW-
     ING "LOOK"
5010 IF A$=A1$ THEN 1000:'IF ONLY THE WORD
     "LOOK" WAS TYPED, GO BACK TO ROOM
     DESCRIPTION.
5020 IF B$="WRITING"THEN PRINT"THE WRI-
     TING SAYS:'WITH A BUCKET AROUND,
     THERE IS OIL TO BE FOUND' "
5030 IF B$="GUN" THEN PRINT"THE GUN IS
     MARKED 'PRESS TO FIRE' "
5040 IF B$="DISK" THEN PRINT"THE DISK
```

```
1065 PRINT
1070 IF L=1 AND O(7)=1000 THEN C
LS3:PRINT"Y O U  W O N!":PRINT:S
OUND 1,10:SOUND 20,9:SOUND 50,14
:END
1100 PRINT:PRINT"WHAT WOULD YOU
LIKE TO DO NOW":INPUT A$
1199 'FIND THE FIRST WORD TYPED
IN (UP TO THE SPACE) AND CALL IT
 A1$
1200 FOR C=1 TO LEN(A$): IF MID$
(A$,C,1)=" "THEN A1$=LEFT$(A$,C-
1):B$=MID$(A$,C+1,LEN(A$)-C):GOT
O 1230 ELSE NEXT C
1210 A1$=A$:'ONLY ONE WORD TYPED
 IN
1230 FOR C=1 TO N
1240 IF C$(C)=A1$ THEN A=C(C):GO
TO1400 :'IF VERB IS IN COMMAND L
IST THEN GOTO 1400
1250 NEXT C
1260 PRINT"I DO NOT UNDERSTAND T
HE VERB":GOTO 1100 :'BACK TO INP
UT STATEMENT
1400 ON A GOTO 2000,3000,4000,50
00,6000,7000,8000,9000
1999 'TAKE ROUTINE
2000 FOR C=1 TO Y
2010 IF B$=O$(C) AND O(C)=L AND
O$(C)<>"*" THEN O(C)=1000:PRINT
LO$(C)" HAS BEEN TAKEN":GOTO 110
0
2020 NEXT C
2030 IF B$="OIL" THEN GOTO 2060
2050 PRINT"SORRY, YOU CAN'T TAKE
 THAT":GOTO 1100
2060 IF O(7)=L THEN INPUT"WITH W
HAT";I$:IF I$="BUCKET" AND O(8)=
1000 THEN O(7)=1000:PRINT"TAKEN"
:GOTO 1100
2062 PRINT"SORRY, YOU ARE UNABLE
 TO TAKE   THE OIL.":GOTO 1100
2999 'DROP ROUTINE
3000 FOR C=1TO Y
3010 IF B$=O$(C) AND O(C)=1000 T
HEN O(C)=L:PRINT LO$(C)" HAS BEE
N DROPPED.":GOTO 1100
3020 NEXT C
3030 PRINT"SORRY, YOU ARE NOT CA
RRYING "B$:GOTO 1100
3999 'GO ROUTINE
4000 FOR C=1TO4:IF B$=T$(C) THEN
 DR=C:GOTO 4020 :'DR=DIRECTION #
4010 NEXT C:GOTO 4050 :'NO DIREC
TION GIVEN
4020 IF T(DR,L)>0 THEN L=T(DR,L)
:GOTO 4030 'MOVE TO NEW ROOM
4025 IF T(DR,L)<=0 THEN PRINT"CA
N'T GO THAT WAY.":GOTO 1100
4030 IF L=1000 THENPRINT"YOU HAV
E JUST DIED":END:'IF PLAYER DIES
, END GAME
4040 GOTO 1000
4050 PRINT"TRY A DIRECTION":GOTO
```

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```
        SHOWS A PICTURE OF A WALL. UNDER-
        NEATH THE PICTURE ARE THE WORDS
        'USE ME TO OPEN DOORS.' "
5090 PRINT:GOTO 1100
```

As you can see from the above example, each object that can be LOOKed at is listed, followed by what the player sees when he looks at the object.

MAKING THE RIGHT MOVE

In some Adventures, it is necessary to move certain objects to find other objects (such as moving a bed to reveal a trap door). We can keep track of these objects by assigning a variable to them. If that variable is O, as it is whenever the game is RUN, the object has not been moved. When the player MOVES the object, the object below it is revealed. Such is the case in the sample "Miniventure" we have been making as we go along. In it, the player must MOVE the altar in order to find a hidden door. Here is a sample MOVE routine.

```
6000 'MOVE ROUTINE
6010 IF B$="ALTAR" AND L=5 THEN PRINT
     "THE ALTAR MOVES, REVEALING A HID-
     DEN DOOR.":LO$(10)="DOOR":O$(10)= "*"
     :0(10)=5:ALTAR=1:GOTO 1100
```

If the player typed "MOVE ALTAR," and he was in the same room as the altar (room 5), the program would PRINT that a previously hidden door was revealed. It would then add the door at the end of the object list (in this case as object 10), identifying it as an immovable object, and placing it in room 5. Next it would change the value of ALTAR from 0 to 1 — indicating that the altar has been moved. From there, it zooms back to line 1100 to ask what the player wants to do. Note that in the verb list, if the player types PUSH or PULL the computer will go to the same routine.

UNLOCKING SECRETS

The Adventurer has discovered a door. The door may be in one of three states: open and unlocked, closed and unlocked, or closed and locked. For the Adventure, we will represent these possibilities by numbers: 0 for closed and locked, 1 for closed and unlocked, and 2 for open and unlocked. DOOR will be the variable used for this purpose. If you have more than one door, you could call them D1, D2, etc.

When the player comes to the door, it is in its default position — closed and locked (0). Thus before he can open it, he must UNLOCK IT. Unlocking doors and the like can be acheived very simply:

```
7000 'UNLOCK ROUTINE
7010 IF B$="DOOR" AND ALTAR=1 AND L=5
     THEN INPUT"WITH WHAT";I$:IF I$=
     "DISK" AND O(2)=1000 THEN PRINT "THE
     DOOR UNLOCKS":DOOR=1:GOTO 1100
7030 IF B$="DOOR" THEN PRINT"YOU FIND
     YOURSELF UNABLE TO UNLOCK THE
     DOOR.":GOTO 1100
```

Line 7010 checks that the ALTAR has been moved, and if you are in the room with the door (room 5). If so, it asks you "WITH WHAT?" If the player had looked at the disk, he would have seen that it said "FOR UNLOCKING DOORS." If he replies DISK to the question and has the disk (object #2) then the door unlocks. (Unlocking doors with disks may seem out of place to you, but remember that this is an alien planet you crashed on.)

AN OPEN AND SHUT DOOR

Now that the player has successfully unlocked the door he can OPEN it. In order for him to do that though, he must: 1) be in the same room as the door, and 2) have first unlocked the door. The OPEN routine listed

```
 1100
5000 'LOOK ROUTINE
5010 IF A$=A1$ THEN 1000:'ONLY L
OOK TYPED
5020 IF B$="WRITING" THEN PRINT"
THE WRITING SAYS 'WITH A BUCKET
AROUND, THERE IS OIL TO BE FOUND
.'"
5030 IF B$="GUN" THEN PRINT"THE
GUN IS MARKED 'PRESS TO FIRE'"
5040 IF B$="DISK" THEN PRINT"THE
 DISK SHOWS A PICTURE OF A WALL.
 UNDERNEATH THE PICTURE ARE THE
WORDS 'USE ME TO OPEN DOORS'"
5090 PRINT:GOTO 1100
6000 'MOVE ROUTINE
6010 IF B$="ALTAR" AND L=5 THEN
PRINT"THE ALTAR MOVES, REVEALING
 A    HIDDEN DOOR.":LO$(10)="DOO
R":O$(10)="*":O(10)=5:ALTAR=1:Y=
Y+1:GOTO 1100
7000 'UNLOCK ROUTINE
7010 IF B$="DOOR" AND ALTAR=1 AN
D L=5 THEN INPUT"WITH WHAT";I$:I
F I$="DISK" AND O(2)=1000 THEN P
RINT"THE DOOR UNLOCKS":DOOR=1:GO
TO 1100
7030 IF B$="DOOR" THEN PRINT"YOU
 CAN'T UNLOCK THE DOOR."
8000 'OPEN ROUTINE
8010 IF B$="DOOR" AND L=5 AND DO
OR=1 THEN DOOR=2:PRINT"THE DOOR
SWINGS OPEN."
8020 IF DOOR=2 THEN T(2,5)=7:T(1
,7)=5
8025 IF DOOR=0 AND B$="DOOR"THEN
 PRINT"THE DOOR IS LOCKED"
8030 GOTO 1100
8999 'INVENTORY
9000 CLS:PRINT"YOU ARE CARRYING
THE FOLLOWING:"
9010 FOR C=1TO Y
9020 IF O(C)=1000 THEN PRINTLO$(
C)
9030 NEXT C:GOTO1100
10000 END
```

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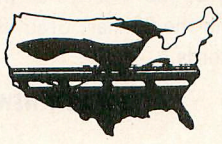

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below takes care of that.

```
8000 ' OPEN ROUTINE
8010 IF B$="DOOR" AND L=5 AND DOOR=1
     THEN DOOR=2:PRINT"THE DOOR SWINGS
     OPEN."
8030 GOTO 1100
```

Of course, it does no good just to have an open door leading to nothing. So, let's modify our travel table so the the door, which lies to the south, leads to the City of the Ancients (room 7).

```
8020 IF DOOR=2 THEN T(2,5)=7: T(1,7)=5
```

This modifies the travel so that a south passage from room 5 leads to room 7 and a north passage from room 7 leads to room 5. The player has now successfully gotten around the wall by taking another route.

AND THE WINNER IS . . .

Congratulate yourself. Your Adventure is 95 percent complete (who said you couldn't write an Adventure). The remaining five percent is printing a title page and instructions (if necessary) and congratulating the player when he solves the Adventure.

Usually, the Adventure is solved when the player brings some key object or objects where they are supposed to be. You can put a check in where the Adventure prints the room description to see if this is the case. In this sample called *Miniventure*, the player must bring the oil back to the room with the spaceship. The check to see if he won is this:

```
1070 IF L=1 AND O(7)=1000 THEN CLS3: PRINT"
     Y O U    W O N !":END
```

There! A 100 percent complete Adventure!

So get busy, think up some great ideas, and maybe *you* can win *the Rainbow's* Adventure Contest! But even if you don't, creating an Adventure can be a very rewarding experience. After all, an Adventure is just as much a creative piece of your imagination as it is a computer program.

Suggested Further Reading:

Writing BASIC Adventure Programs For The TRS-80, by Frank Dacasta. TAB Books Inc., Blue Ridge Summit, PA 17214. Price: $9.95. This is a well written book on Adventure programming, but it is primarily for the Models I and III. Available from local book stores or direct from the publisher.

Adventure Writing Data Sheet. Available from Aardvark, Ltd., 2352 S. Commerce Rd., Walled Lake, MI 48088. Price: $4.95. Gives instructions primarily on how to program Adventures. Includes a program listing of an Adventure called *Deathship*.

Micro Adventurer. A monthly magazine devoted solely to Adventures and strategy games. Write to: Business Press International, 205 E. 42nd Street, New York, NY 10017 for more details.

The Rainbow Book of Adventures. A 112-page book just released by Falsoft, Inc., publishers of *the Rainbow*. It contains award winning Adventures selected from entries in the First Annual Rainbow Adventure Contest. Price: $7.95. For an additional $8, you may obtain the *Rainbow Adventure* Tape, a cassette with all 14 Adventures ready to load and run. Contact *the Rainbow* for details.

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Keys To Creating Winning Adventures

By Bob Liddil

The Kid hunkers down over the wheel of his '57 Chevy, the floor shifter vibrating in his hand as he lightly tickles the gas pedal. The massive 427 fuel-injected engine purrs like a caged tiger begging for freedom. The Kid impatiently steals a glance at the bib overalled moonshiners as they lug the last jars of White Lightning for the run.

With the bang of the trunk lid closing, he's off! Small stones and dust fly under his wheels as he whips the stubby little car around the last dirt hairpin and onto the main highway.

But Sheriff Bubba Clemmons knows The Kid. He knows there's "shine" in the back of the car and he knows that this is going to be *The Kid's last run.* He has to stop him from making it to Knawbone.

So begins the duel.

Does this sound like a teaser from a TV movie? Actually, it's the premise for a BASIC language Adventure written for the TRS-80 by a fellow named Don Boner with the help of his daughter Freda.

Hold on, you say. Adventure is all caves and bats and dragons and wizards. Not necessarily so. Not so at all.

Although the original Adventure, *The Colossal Cave,* was all underground, the genre Adventure can be any subject under the sun. Scott Adams, Grand Poohbah of Adventure, released *Adventureland, Pirate's Cove, Mystery Funhouse* and many other all time best sellers without once touching on the "Dungeons and Dragons" thematics which dominate today's current Color Computer market.

Strange Odyssey is an Adventure based on overcoming an alien machine to accomplish the puzzle's solution. *Sands of Egypt* is set in a remote desert which bears little resemblance to the wizards' and warriors' worlds. *Calixto Island* employs no aspects of Fantasy Role Playing. It is possible to create brave Adventures under almost any theme at all.

Problems much more complicated than mere coding face the would-be Adventure writer. He has to choose a subject that will excite the player, make him desperate to find a solution. It must be simple, yet complicated, frustrating but satisfying and above all, it must be logical.

Here's what I believe constitutes the making of a good Adventure.

SELECT A THEMEWORLD. Decide what timeframe your program will exist in and stick with it. A Fantasy World, for example, should be consistent throughout the game. One would not expect to employ laser pistols in combat against dragons. Traps should have the feeling of the period. A pit of spikes or an acid bath such as found in *Tower of Fear* is reasonable. A Cyclops, mythical or fantasy figure, which vanishes after being killed, smacks of magic. Since the tower was created by Blackheart Firethrower, ace Necromancer, to hold his treasures, we find a level of believability about the program and the things we have to do to win.

A modern themeworld such as that used in *Thunder Road* employs props one might expect. The '57 Chevy, the lady hitchhiker, Sheriff Bubba, always in pursuit, the dumb deputy's roadblock, all combine to create an atmosphere of authenticity that lends clues to the user about his next course of action.

What themeworlds could you use for an Adventure?

FUTUREWORLD: How about an astronaut trapped in a space lab that will soon fall from orbit? Officially, you aren't allowed to try a rescue; they don't want to risk losing you. But the trapped man is your friend and you must try to save him. Props might include a space shuttle, a magnetic ID card to activate the launch sequence, an angry guard who would have to be sedated, an oxygen bottle, necessary to save the "maroonee" from suffocation in the spacewalk back to the shuttle.

EARTH PAST: As a gladiator in ancient Rome, you must fight your way to freedom in the arena. You are pitted against hungry lions and tigers for the edification of the crowd and you win, ingeniously, by choosing the correct weapon. But the mighty Nero has a last surprise in store for you. It is a labyrinth, a maze of corridors containing mechanical traps, enemy spearmen, deadly creatures, or politicians making speeches, all designed to inflict cruel death on you. But if you survive, all Rome will be at your feet. Can you emerge victorious?

SPACE OPERA: The dead space ship with just a hint of something amiss is a themeworld with many variables possible. In the classic text Adventure *Death Dreadnaught,* what is amiss unfolds slowly as the player explores the ship. Scenes of violence become increasingly evident in the form of "screen prints" on the walls or in the power room where

"once splendid engines lay fused, mutilated and useless." Of course, escape becomes imperative once the presence of the ferocious alien creature who did all this damage becomes known. Props include food batteries, a laser pistol, oxygen tank and more. There are so many different possibilities within this formula that just outlining them would take several pages. Obviously, every science fiction novel you ever read holds clues to your space opera.

The Andrea Doria, a sunken ship scenario, an ancient temple, a wild west resplendent with bandits and saloons, a cemetery with graves that turn out to be the gateway to Hades, a love boat, an island with a five-dimension stargate, a time machine, a submarine, a mysterious planet with robots guarding an ancient treasure—the divergence of themeworlds is as universal as the imagination.

But, is it enough to have a good universe?

No.

PLOT LOGIC is the glue that holds all Adventures together. Each piece of the puzzle must fit neatly into the next. There must be a plausible solution for that brain teaser which halts the program in its tracks. If there are flat tires in The Kid's future in *Thunder Road,* then there had better be a reasonable way to repair them or a spare and a CHANGE TIRES command.

Adventure is an extremely Newtonian place. An author should be prepared to provide a reaction to every input. If there are too many "YOU CAN'T DO THAT" replies appearing on the screen, you can bet that player will go back to playing *The King* and not pick up your program again.

An object need not always advance the plot. A location within the theme framework need not always place the player closer to winning. But they should be interesting diversions that enhance the overall believability of the game.

Tower of Fear has a room at the top of the ivy which has exasperated Adventure players since the program's debut three years ago. Once you get in, you simply *cannot* get out. It is a classic cul de sac that diverts the user's attention from his real task, that of getting into the tower. It takes awhile, but after dying 30 times in one location trying to figure an angle, one eventually goes back to the beginning and works out the right sequence. By now, the player never wants to see that stupid room again, not realizing that the author has given it a secret door cued to an obscure action to be done elsewhere in the tower.

The lesson here is to tie the objects and locations together so that individually and collectively they form a cohesive and decipherable puzzle.

PLAYABILITY: If you follow the rules of *plot logic,* game will be very playable. But give your user more. Give him lavish descriptions of his surroundings, being careful to consider all the things he can GET or GO to. Be intricate without being oblique, be tricky, if you're using pictures, don't be unfair. Above all, even if you're using pictures, don't be afraid to employ every application of language possible. Have your player shaking his head in disbelief when he discovers what you *really* meant when you dropped him 30 yards straight down into a dragon's lair.

When you write an Adventure, you are in every sense, creating a "compu-novel," a self-contained, well-plotted story with twists and goals and puzzles and intrigue such as to rival a book. Give your user a lean, playable, exciting Adventure and he'll be back every time you write a new one.

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A Menu Is Helpful For Choosing The Right Course

By Don Inman
Rainbow Contributing Editor

If you are going to use a program more than once, proper documentation should be provided so that the program can be easily and efficiently used. The time spent on documentation will result in time saved when the program is used again. Documentation that is internal should include lots of prompts as discussed in "Using Graphics," February '83 *Rainbow*.

Menus used within a program serve a dual purpose. They not only provide ease of program use, but they also aid the programmer in writing a program that is structured by the menu selections. Menus are probably the most neglected item when programs are being written for our own use.

I'll use the graphics associated with a pie (or circle) graph to demonstrate how menus can be used. In planning a program and its main menu, you must consider how the data will be entered, how the data will be manipulated, and how the results may be used. Items on the menu should appear in the order of use whenever possible. When a selection is made from the menu, control is passed to the selected section of the program. After the necessary chores are performed in that section, a return to the main menu should be provided. Subroutines appear to be an ideal way to perform various sections selected from the main menu.

You know that specific information will be needed to draw the graph. Therefore, the first menu item might be:

Pie Graph Menu
1) INPUT INFORMATION

This section will accept the information that you provide. It will also calculate and set up the necessary parameters for drawing the graph. It will then return you to the main menu.

Another section that might be desirable would be a preliminary drawing that uses the information provided in section one. You might decide upon changes after looking at the preliminary graph. We now have:

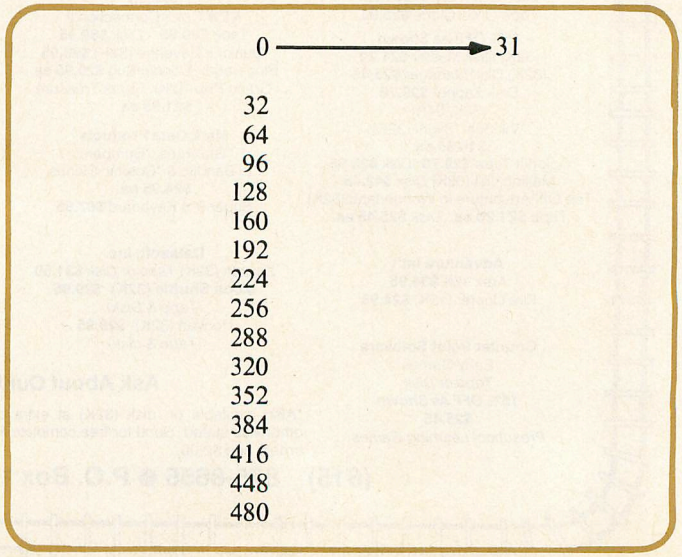
PIE GRAPH MENU
1) INPUT INFORMATION
2) PRELIMINARY DRAWING

After viewing the preliminary drawing, a return would be made to the main menu. If changes are needed to your original information, you would select item 1 again to make those changes.

After you have the graph drawn to your satisfaction, you may have choices as to what to do with the results, such as: send to screen, send to printer, save informaton on disk or tape, etc. Therefore, we add a third section.

PIE GRAPH MENU
1) INPUT INFORMATION
2) PRELIMINARY DRAWING
3) OUTPUT RESULTS

Some of us cannot sit down and plan out a complete program at one sitting. The temptation to sit down to our Color Computer and begin is just too strong. If you feel this way, you can stop at this point and decide how to program the main menu. The options for the menu placement on the screen are almost endless. *PRINT*@ statements can be used to locate the text as desired. Remember, have 32 characters per line and 16 lines with the print positions numbered as follows:



(Don Inman is the acknowledged master of microcomputer graphics and the author of a large number of books, including "TRS-80 Color Computer Graphics" and "Assembly Language Graphics for the TRS-80 Color Computer" with Kurt Inman.)

Most programmers seem to go to the center of the screen, but other locations can be used. Here are two options.

```
PIE GRAPH MENU

1) INPUT INFORMATION
2) PRELIMINARY DRAWING
3) OUTPUT RESULTS

ENTER THE NUMBER OF
THE SELECTION DESIRED
```

```
100 REM ** MAIN MENU **
110 CLS
120 PRINT@73,"PIE GRAPH MENU";
130 PRINT@166,"1. INPUT INFORMAT
ION";
140 PRINT@230,"2. PRELIMINARY DR
AWING";
150 PRINT@294,"3. OUTPUT RESULTS
";
160 PRINT@416,"ENTER THE number
OF";
170 PRINT@448,"THE SELECTION DES
IRED";
180 '
200 A$=INKEY$
210 IF A$="" THEN 200
220 ON VAL(A$) GOSUB 1000,2000,3
000
230 GOTO 110
240 '
```

Subroutines to be added later.

```
PIE GRAPH MENU

1) INPUT INFORMATION
2) PRELIMINARY DRAWING
3) OUTPUT DESIRED

ENTER THE NUMBER OF
THE SELECTION DESIRED
```

For this second version change the *PRINT*@ values in lines 120, 130, 140 and 150 with:

```
120 PRINT@73, . . . . .
130 PRINT@166, . . . . .
140 PRINT@230, . . . . .
150 PRINT@294, . . . . .
```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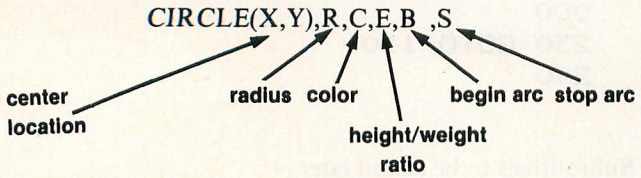
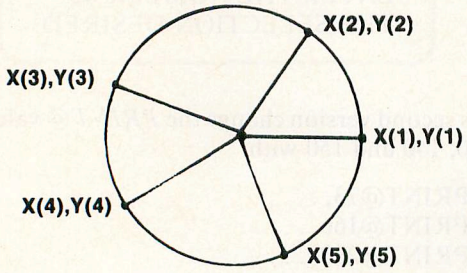
Now that the main program is finalized, we can move on to the subroutines. We must decide what information is needed to draw a circle graph. We know we can draw a circle with the Color Computer statement:



We also know we must provide the number (N) of sections into which the circle is to be divided. We certainly need to provide the X and Y values for the center of the circle and the radius (R). A problem arises when we try to find a way to divide the circle into sections. How do we locate the points

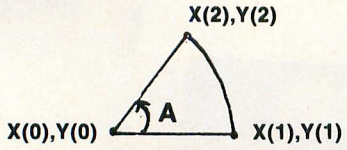


(X(1),Y(1)); X(2),Y(2)); etc. to draw the lines separating the secions? By looking at the circle diagram, you can see that X(1) and Y(1) values can be determined by:

(X(1) = X(0) +R and
(Y(1) = Y(0).

The other X(n),Y(n) values can be found by equations developed in the April 1983 issue of *the Rainbow* in the article "Regular Polygons." They were:

X(2) = X(1)+COS(A)*R and
Y(2) = X(1)-SIN(A)*R, where A is the angle between the lines drawn from the center of the circle to the
= points of the circle.



Therefore, we must provide an input that will describe the angle for each of the section dividing lines. This can be done as a percent (P) of the total circle.

```
PRINT"% FOR SECTION";Z;
INPUT P
P(Z)=P(Z-1)+P     ← add new percent to old percent
A=P(Z)*3.1416/50  ← calculate angle in radians
                    (total circle = 2 (pi) radians)
```

The complete information subroutine is:

```
1000 REM ** INPUT INFO **
1010 CLS
1020 INPUT "NUMBER OF SECTIONS";
N
1030 INPUT "CENTER OF CIRCLE (X,
Y)";X(0),Y(0)
1040 INPUT "RADIUS OF CIRCLE";R
1050 P(0) = 0
1060 FOR Z = 1 TO N
1070 PRINT"% FOR SECTION";Z;
1080 INPUT P
1090 P(Z) = P(Z-1) + P
1100 A(Z) = P(Z)*3.1416/50
1110 X(Z) = X(0)+R*COS(A(Z))
1120 Y(Z) = Y(0)-R*SIN(A(Z))
1130 NEXT Z
1140 RETURN
```

After the information entries have been made in subroutine 1000, control is returned to the main program where the menu is displayed again.

The second choice, PRELIMINARY DRAWING, must be written. Assuming you have already completed the first choice, all the necessary information is stored in the computer. The second subroutine should provide a choice of *PMODE, SCREEN,* and COLOR (if desired).

```
2000 REM ** PRELIMINARY DRAWING
**
2010 CLS
2020 INPUT "PMODE";M
2030 INPUT "COLOR (FORE,BACK)";F
,B
2040 PMODE M
2050 PCLS
2060 COLOR F,B
2070 SCREEN 1,0
2080 CIRCLE(X(0),Y(0)),R
2090 FOR Z = 1 TO N
2100 LINE(X(0),Y(0))-(X(Z),Y(Z))
,PSET
2110 NEXT Z
2120 A$ = INKEY$
2130 IF A$ = "" THEN 2120
2140 RETURN
```

Lines 2030 and 2060 are optional. The loop at lines 2090-2110 draw lines from the center of the circle to the calculated points on the circle. Lines 2120 and 2130 hold the graph on the screen until you have a chance to view the graph. Study it carefully and see if you wish to change the size or any other parameter of your drawing. Then press any key to return to the main menu.

The output section (the third choice on the menu) will largely depend upon the equipment that you are using with your computer. Here is a submenu for subroutine 3000.

OUTPUT OPTIONS

1. OUTPUT GRAPH TO SCREEN
2. OUTPUT GRAPH TO PRINTER
3. OUTPUT DATA

ENTER THE NUMBER OF
THE SELECTION DESIRED

The first selection could pass control to the subroutine at 2000. The second selection would require screen print software. The third could present another submenu with options such as:

```
OUTPUT DATA
1. TO PRINTER
2. TO SCREEN
3. TO DISK
4. TO CASSETTE

ENTER THE NUMBER OF
THE SELECTION DESIRED
```

Data would include the angles A(Z), and the X(Z), Y(Z) values calculated in subroutine 1000. You could also include the number of sections (N), the center of the circle X(0), Y(0), and the radius (R).

Example:

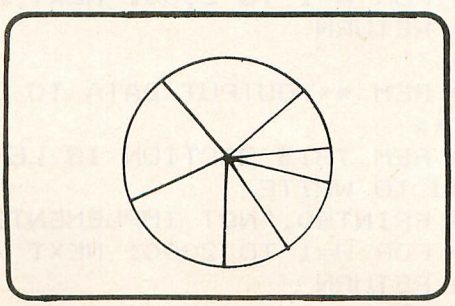
```
6000 REM ** OUTPUT DATA TO PRINT
ER **
6010 PRINT#-2,"NUMBER OF SECTION
S";N
6020 PRINT#-2,"CENTER OF CIRCLE"
;X(0);Y(0)
6030 PRINT#-2,"RADIUS OF CIRCLE"
;R
6040 PRINT#-2,"DATA POINTS Z;A(Z
);X(Z);Y(Z)
6050 FOR Z=1 TO N
6060 PRINT#-2,Z;A(Z);X(Z);Y(Z)
6070 NEXT Z
6080 RETURN
```

Other sections are left for you to develop. An example of a run using the following inputs is shown.

INPUTS

Number of sections: 8
Center of circle: 130, 100
Radius 80
% — section 1 10
section 2 25
section 3 20
section 4 18
section 5 10
section 6 5
section 7 8
section 8 4

SCREEN OUTPUT



Printer Output

```
NUMBER OF SECTIONS 8
CENTER OF CIRCLE 130  100
RADIUS OF CIRCLE 80
DATA POINTS Z;A(Z);X(Z);Y(Z)
 1   .62832  194.721291  52.9770848
 2   2.19912  82.9768469  35.2788823
 3   3.45576  53.9156785  124.721975
 4   4.586736  119.974193  179.369284
 5   5.215056  168.541149  170.104064
 6   5.529216  188.318198  154.763014
 7   6.031872  207.486934  119.894098
 8   6.2832  210  99.9988245
```

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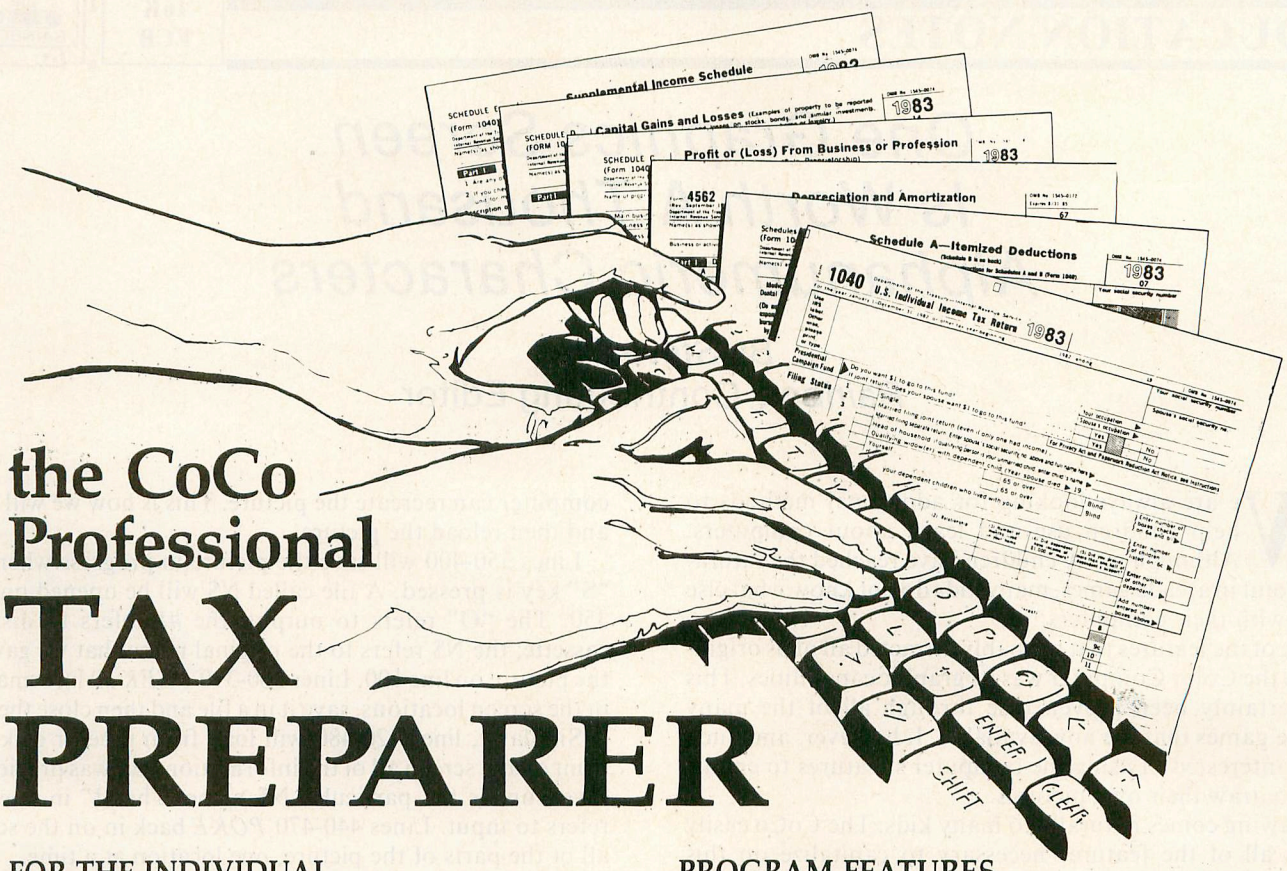
```
1050.....01C1  235
3040.....03D4  150
5060.....05CA  131
7030.....07F8  228
END.....0994   96
```

The listing:

```
100 REM ** MAIN MENU **
110 CLS
120 PRINT@73,"PIE GRAPH MENU";
130 PRINT@166,"1. INPUT INFORMAT
ION";
140 PRINT@230,"2. PRELIMINARY DR
AWING";
150 PRINT@294,"3. OUTPUT RESULTS
";
160 PRINT@416,"ENTER THE number
OF";
170 PRINT@448,"THE SELECTION DES
IRED";
180 '
200 A$=INKEY$
210 IF A$="" THEN 200
220 ON VAL(A$) GOSUB 1000,2000,3
000
230 GOTO 110
240 '
1000 REM ** INPUT INFO **
1010 CLS
1020 INPUT "NUMBER OF SECTIONS";
N
1030 INPUT "CENTER OF CIRCLE (X,
Y)";X(0),Y(0)
1040 INPUT "RADIUS OF CIRCLE";R
1050 P(0) = 0
1060 FOR Z = 1 TO N
1070 PRINT"% FOR SECTION";Z;
1080 INPUT P
1090 P(Z) = P(Z-1) + P
1100 A(Z) = P(Z)*3.1416/50
```

```
1110 X(Z) = X(0)+R*COS(A(Z))
1120 Y(Z) = Y(0)-R*SIN(A(Z))
1130 NEXT Z
1140 RETURN
1150 '
2000 REM ** PRELIMINARY DRAWING
**
2010 CLS
2020 INPUT "PMODE";M
2030 INPUT "COLOR (FORE,BACK)";F
,B
2040 PMODE M
2050 PCLS
2060 COLOR F,B
2070 SCREEN 1,0
2080 CIRCLE(X(0),Y(0)),R
2090 FOR Z = 1 TO N
2100 LINE(X(0),Y(0))-(X(Z),Y(Z))
,PSET
2110 NEXT Z
2120 A$ = INKEY$
2130 IF A$ = "" THEN 2120
2140 RETURN
2150 '
3000 REM ** OUTPUT RESULTS **
3010 CLS
3020 PRINT@73,"OUTPUT OPTIONS"
3030 PRINT@166,"1. GRAPH TO SCRE
EN"
3040 PRINT@230,"2. GRAPH TO PRIN
TER"
3050 PRINT@294,"3. OUTPUT DATA"
3060 PRINT@416,"ENTER THE NUMBER
 OF"
3070 PRINT@448,"THE SELECTION DE
SIRED"
3080 '
3100 REM ** ITEM SELECTION **
3110 A$ = INKEY$
3120 IF A$ = "" THEN 3110
3130 ON VAL(A$) GOSUB 2000,4000,
5000
3140 RETURN
3150 '
4000 REM ** OUTPUT GRAPH TO PRIN
TER **
4010 REM THIS SECTION IS LEFT FO
R YOU TO COMPLETE
4020 PRINT@0,"NOT IMPLEMENTED"
4030 FOR W=1 TO 2000: NEXT W
4040 RETURN
4050 '
5000 REM ** OUTPUT DATA **
5010 CLS
5020 PRINT@73,"OUTPUT DATA"
5030 PRINT@102,"1. TO PRINTER"
5040 PRINT@166,"2. TO SCREEN"
5050 PRINT@230,"3. TO DISK"
5060 PRINT@294,"4. TO CASSETTE"
5070 PRINT@416,"ENTER THE NUMBER
 OF"
5080 PRINT@448,"THE SELECTION DE
SIRED"
5090 '
5100 REM ** ITEM SELECTION **
5110 A$ = INKEY$
5120 IF A$ = "" THEN 5110
5130 ON VAL(A$) GOSUB 6000,7000,
8000,9000
5140 RETURN
5150 '
6000 REM ** OUTPUT DATA TO PRINT
ER **
6010 PRINT#-2,"NUMBER OF SECTION
S";N
6020 PRINT#-2,"CENTER OF CIRCLE"
;X(0);Y(0)
6030 PRINT#-2,"RADIUS OF CIRCLE"
;R
6040 PRINT#-2,"DATA POINTS Z;A(Z
);X(Z);Y(Z)
6050 FOR Z=1 TO N
6060 PRINT#-2,Z;A(Z);X(Z);Y(Z)
6070 NEXT Z
6080 RETURN
6090 '
7000 REM ** OUTPUT DATA TO SCREE
N **
7005 CLS
7010 PRINT@0,"NUMBER OF SELECTIO
NS";N
7020 PRINT@32,"CENTER OF CIRCLE"
;X(0);Y(0)
7030 PRINT@64,"RADIUS OF CIRCLE"
;R
7040 PRINT@100,"Z      A(Z)    X(Z
)    Y(Z)"
7050 FOR Z = 1 TO N
7060 PRINT USING"####.##";Z;A(Z)
;X(Z);Y(Z)
7070 NEXT Z
7080 A$ = INKEY$
7090 IF A$ = "" THEN 7080
7100 RETURN
7110 '
8000 REM ** OUTPUT DATA TO DISK
**
8010 REM THIS SECTION IS LEFT FO
R YOU TO WRITE
8020 PRINT@0,"NOT IMPLEMENTED"
8030 FOR W=1 TO 2000: NEXT W
8040 RETURN
8050 '
9000 REM ** OUTPUT DATA TO CASSE
TTE **
9010 REM THIS SECTION IS LEFT FO
R YOU TO WRITE
9020 PRINT@0,"NOT IMPLEMENTED"
9030 FOR W=1 TO 2000: NEXT W
9040 RETURN
```



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One Graphics Screen Is Worth A Thousand Alphanumeric Characters

By Steve Blyn
Rainbow Contributing Editor

We are always looking for additional methods to help children use and learn about computers. Although many children have reached the saturation point in arcade games, many kids do not know what else to do with their computers.

One of the features that probably attracted all of us originally to the Color Computer was its graphic capabilities. This has certainly been proven true through all of the many arcade games that are now available. I, however, am much more interested in using the computer's features to enable kids to draw their own pictures.

Drawing comes naturally to many kids. The CoCo easily offers all of the features necessary to capitalize on this interest. A picture can easily be drawn and saved to tape or disk. This picture can then be recalled at any time for viewing or improvements. The improved picture can then be resaved. This is all easily handled through files.

This month's program merely scratches the surface of the world of files. Files enable us to easily save information and then reload or recall it for future use. In the December, 1983 issue of *the Rainbow,* Richard White wrote a lovely article about understanding cassette and disk file operations. His article is an excellent reference for those who wish to delve deeper into the topic.

Our plan was to create an Etch-A-Sketch program and then save the pictures that are created. Lines 110-310 create the Etch-A-Sketch. The arrow keys are used for drawing. They are the character strings numbered 8, 9, 10 and 94 on lines 150-180.

A few extra features were included for interest. The "C" key from line 190 allows the user to change and use all of the eight available colors. The "E" from lines 200 and 330 act as an eraser to improve the drawing possibilities. Pressing an arrow and the "E" key draws a blank to enable moving the cursor invisibly to a new location.

ROM locations 1024 to 1535 contain the information that is pointed on a low resolution screen. Location 1024 is the top left corner of your screen and 1535 is the bottom right corner of the screen. There are 16 lines each with 32 locations for a total of 512 locations.

The picture can then be saved by *PEEKing* those locations. The computer will then know what is there. By *POKEing* the same information back into those locations, the computer can recreate the picture. This is how we will save and then reload the picture.

Lines 350-400 will save the picture in progress when the "S" key is pressed. A file called N$ will be opened on line 350. The "O" refers to output; the #1 refers to disk or cassette; the N$ refers to the original name that we gave to the picture on line 100. Lines 360-390 *PEEK* all information in the screen locations, save it in a file and then close the file.

Similarly, lines 420-480 will load from tape or disk and print on the screen all of the information that was previously saved under the particular N$ name. The "I" in line 430 refers to input. Lines 440-470 *POKE* back in on the screen all of the parts of the picture, one location at a time.

This program can be run on cassette or disk systems. The device #-1 refers to cassette while a #1 will refer to disk. This version of the program was written for disk. Lines 350, 370, 390, 430, 450 and 480 tell the computer which device we are using. Change the #1s to #-1s on these lines if you are using cassettes.

We have used the disk version of this program with several classes of children. It was equally enjoyed by various aged students. We give a new name (N$) to each new picture that is created. Limit the name to eight letters or less. The name is either the child's name or the type of picture that he wants to draw. Using picture subject as the name can be dangerous in a large group because when one child decides to call a picture a certain name, then others will decide on that name also. We had five pictures called "HOUSE" in one class before we realized the error. Each succeeding "HOUSE" file will wipe out the previous one on disk. You will be able to save at least 30 different pictures on a single disk. Although you can easily save this many on a cassette, the time involved in searching for each will certainly drive you to tears.

Some children are timid about using any new computer program. This program allows him to go back at a later time and rework or improve any picture that was previously started. Simply enter the name of any previous picture, use the "L" key to load it and it may be reworked and resaved time after time.

We have also used this program at home and in school as a type of picture gallery or show. Pictures are loaded one after another for evaluation or comment by the other kids. It's a lot of fun and non-threatening because the pictures can so easily be improved and resaved.

The Computer Island staff is always interested in your comments. We would love to hear how you use the programs with your youngsters.

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

The listing:

Rainbow Check Plus

190 0206	30
END 03FB	60

```
10 REM"DRAWING"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1983
30 CLS8:PRINT@9,"PICTURE SAVER";
40 PRINT@98,"USE THE ARROW KEYS
TO DRAW";
50 PRINT@162,"USE 'S' TO SAVE TH
E PICTURE";
60 PRINT@194,"USE 'L' TO LOAD A
PICTURE";
70 PRINT@226,"USE 'C' TO CHANGE
COLORS";
80 PRINT@258,"USE 'E' AS AN ERAS
ER";
90 PRINT@290,"USE 'M' FOR MENU";
100 PRINT@416,"WHAT IS THE NAME
OF THIS PICTURE";:INPUT N$
110 CLS0
120 PRINT@480,N$;
130 X=32:Y=16
140 A$=INKEY$
150 IF A$=CHR$(9) THEN X=X+1
160 IF A$=CHR$(8) THEN X=X-1
170 IF A$=CHR$(10) THEN Y=Y+1
180 IF A$=CHR$(94) THEN Y=Y-1
190 IF A$="C" THEN C=C+1
200 IF A$="E" THEN GOTO 330
210 IF A$="S" THEN GOSUB 350
220 IF A$="L" THEN GOSUB 420
230 IF A$="M" THEN RUN
240 IF A$="" THEN 140
250 IF X>63 THEN X=1
260 IF X<1 THEN X=63
270 IF Y>31 THEN Y=1
280 IF Y<1 THEN Y=31
290 IF C>8 THEN C=1
300 SET(X,Y,C)
310 GOTO 140
320 REM"THE ERASER IS HERE"
330 RESET(X,Y):GOTO 140
340 REM"SAVE THE PICTURE IN A FI
LE HERE"
350 OPEN"O",#1,N$
360 FOR Z= 1024 TO 1535
370 PRINT#1,PEEK(Z)
380 NEXT Z
390 CLOSE #1
400 RETURN
410 REM"LOAD THE FILE FOR THE PI
CTURE HERE"
420 CLS0:PRINT@480,N$;
430 OPEN"I",#1,N$
440 FOR Z=1024 TO 1535
450 INPUT#1,A
460 POKE Z,A
470 NEXT Z
480 CLOSE#1
490 RETURN
```


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Microcomputers: BIG Isn't Always Better

By Michael Plog, Ph.D.
Rainbow Contributing Editor

A few weeks ago, I was invited to tour a large mainframe computer complex. There were five mainframes at the site, with over 300 disk (not diskette) drive units. These are the large boxes that house rigid disks about eighteen inches across. They are filled with an inert gas, and the disk head rides a few thousandths of an inch above the surface. Some of the newer disk units contained a googolbyte of memory. A googol, by the way, is the number one followed by one hundred zeros. That's more data than the Color Computer can handle, but we are talking about mainframes.

Sidetrack — The mathematician Edward Kasner coined the term for this extremely large number, when he asked his nine-year-old nephew for an appropriate name. The boy came up with "googol" and it was accepted. See, you can learn something in an education column.

Well, back to the story. Another of the units was for mass storage. This is a device that records information on tape, much the same as my little computer. This tape, however, is four inches wide and one hundred feet long. One such spool of tape holds one hundred million bytes of storage. A robot arm gets the correct spool from a honeycomb type wall, loads the data into temporary disk space, and makes it available to the user. No human hands need (or could) handle the mass storage tapes. Of course, there were the regular computer tapes on hand — several thousand of the large reels you see in the movies.

During the tour, I was shown several hundred modem lines connecting the different mainframes to users all across the city and state. They even had a fast printer there, 21,000 lines per minute. The biggest problem, understandably, with the printer is keeping boxes of paper in it. It takes more time to change the paper than to go through an entire box.

The total value of the equipment in this location is six hundred million dollars. Naturally, security precautions were extreme. The electric backup system alone was a complicated process. Batteries could continue the work of the computers for two hours, in case of a power failure. Then, a kerosene generator can take over. There is enough kerosene in the tanks for two weeks.

I admit it, I was thoroughly impressed by all this power and the sheer size of the computers. A friend of mine arranged the tour, probably just to impress me. He is a mainframe programmer, and can make the large machines do just about anything except walk. He wanted to show me what a "real" computer was like.

Well, I got home and had a little work to do on my Color Computer. I had to finish a short program to calculate something or other; prepare a word find game for students in my wife's classroom; and write a letter to a relative. When I sat down in front of my little machine, it did appear puny. The printer seemed to take forever to get through one page. Searching through my floppie diskettes somehow took longer than normal.

Somewhere in the middle of my work, however, I developed a deeper appreciation for the microcomputer. There was no sudden flash of realization on my part; just that I understand better the true value of a microcomputer compared with a mainframe. And you know what — a great deal of that value relates to public education in the United States!

(Michael Plog received his Ph.D. degree from the University of Illinois. In addition to his work as an educational researcher, he is a major partner in the Center for Opinion Research, a firm conducting statewide polling in Illinois. The Color Computer is used in all phases of the polling work.)

GER

Yes, dear reader, you knew all along I was going to get around to education, didn't you. To be truthful, I did not realize the experience of the mainframe tour related to education. (Other than my own acquisition of information.)

The mainframe represents sheer power. Generally, that translates to most of us as importance. I know that many writers have spoken against the concept of "big is better," to the point that the words are seldom used today. Yet, the emotion is still present.

For educational purposes, too much power can be negative! The huge capabilities from a mainframe computer may not be as helpful to students (and teachers, administrators, etc.) as a smaller machine. There are several reasons for this, only a few of which will be addressed here.

First is the difference between education and training. Training can be seen as knowing *why* something works. It is foolish to expect anyone other than a highly trained technician to know much about a mainframe computer. With the microcomputer, however, even small children can learn about them. Students in junior high school can learn more about electronic theory than many adults will ever know —simply becuase of the motivation of the microcomputer.

Of course, the expense is a major problem. Most school districts simply cannot afford a mainframe. Those that have the capability to rent time on a mainframe often have higher priorities for the money. Schools, however, can usually locate enough funds for microcomputers.

Closely tied with the issue of money is the educational value of "close-up" experience. When I was a graduate student, I dealt with a mainframe computer. During all that time, I never actually saw the computer. I passed typed cards through a half door to a bored operator, who fed them into a card reader. I received a printout from another bored operator. Most computer programmers today do not ever get close to the computer. They work with terminals mostly. Adults can handle this separation of relationship (in truth, a cause and effect separated by distance and time). Children, however, need a closer tie to understand the relationship between their actions (keying something into a machine) and the results (getting something out).

Microcomputers are more appropriate to students, just because they are smaller, more manageable. Micros encourage a greater reliance on self; something all schools should strive for.

It appears that educators have indeed received the message that micros are important to schooling. As of January, 1983, over half (53 percent) of schools in the United States had at least one microcomputer! The data on this subject is naturally old, even by the time it is collected. By now, a greater percentage of schools own microcomputers. This is certainly a milestone. Just think, students in a majority of schools in the country have access to a microcomputer. There is a string attached, however.

Micros are not owned equally across schools. Elementary schools in the south tend to be less computer-oriented than elementary schools in the rest of the country. Poorer communities tend to have elementary schools without microcomputers. And non-public schools tend not to have microcomputers. Now this is not surprising. Schools in poorer communities tend to have less of everything — including microcomputers.

Secondary schools in all areas of the country and social strata tend to have microcomputers. True, poorer schools tend to have less access for students to microcomputers than do schools in more affluent areas, but the access is there.

In the not too distant future, the work force will be more computer-oriented than now. Those students missing an opportunity to learn about micros now will find themselves at a disadvantage when they try to compete with students from more enlightened school districts. We are putting a greater disadvantage on those students who can least afford an extra handicap.

The major uses of microcomputers in the schools is predictably programming instruction and "drill and practice." In almost all cases, above average students have more access to microcomputers than do their peers with lower grades.

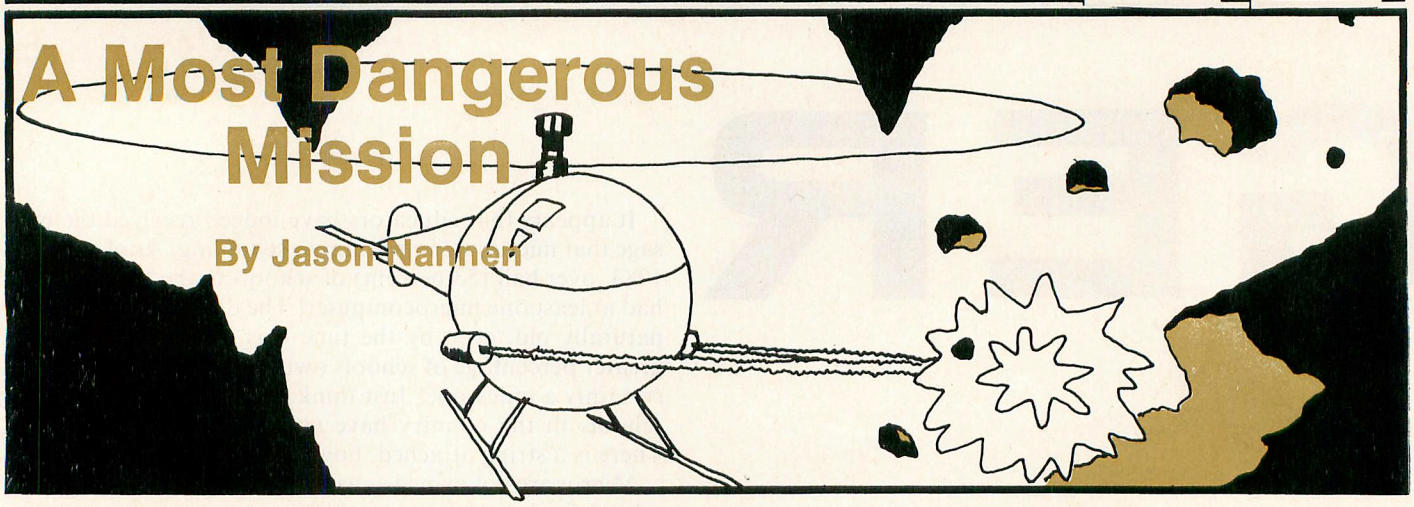
These findings are provided by the Johns Hopkins University, Center for Social Organization of Schools. The Center conducted a national survey of school uses of microcomputers. If you are interested in the entire report, you might try writing the Center at 3505 N. Charles St., Baltimore, MD 21218. I cannot guarantee they will respond.

The Color Computer is not the bellweather machine in schools. (You knew that already.) Those of us who have seen the truth in equipment are not totally out of the picture. More and more educational software is being prepared for the Color Computer. By next month (March, 1984 the Minnesota Educational Computing Consortium (MECC) should have twenty programs available for the Color Computer. This group is one of the largest not-for-profit producers of microcomputer software. To get more information, you can write MECC at 3490 Lexington Avenue North, St. Paul, Minnesota 55112, or call at 612/638-0600. I can almost guarantee they will respond. Even if you cannot use most of the MECC software on your Color Computer, you might still be able to use some of the MECC printed material aobut microcomputers.

Talk to you next month. Until then, remember that the best way to help education is to keep learning.

A Most Dangerous Mission

By Jason Nannen



You are the pilot of an ultramodern helicopter on a mission to recover a precious artifact which, in ancient times, was stolen from your land and hidden in a series of treacherous caverns. As you maneuver your copter through the caverns, you avoid deadly stalactites and stalagmites, and dodge fearsome creatures that suddenly materialize before your copter. As a last resort you fire your powerful laser, clearing a path to safety. If you're skillful you may even collect chunks of gold that line the caverns. At last you reach the cavern of the artifact — the ultimate challenge!

(Jason Nannen, a junior at Wethersfield [Conn.] High School, enjoys programming both games and practical programs for the CoCo. He is interested in the field of psychology and its application to artificial intelligence.)

Yep, that's you when you play *Cavern Copter*, an arcade-type game for the CoCo. Detailed instructions are included in the program listing, but if you don't want an instructions option, exclude lines 106-395.

Cavern Copter can be a fairly diverse game. The five variables in lines 14-18 determine the difficulty of different parts of the game. They are explained in the listing and may be changed to modify the game to your own level of skill. Experiment!

For neat visual effects, there are three unique routines: a cavern-generator, a spiral explosion when the copter crashes, and instructions that scroll across the screen from right to left. If you include instructions, be sure to leave a space before the last quotation mark in each line of data, as in the listing. Otherwise, unwanted characters will trail when the instructions cross the screen.

Hop in your copter and hit the caverns!

Rainbow Check Plus

80	02B9	102
180	0580	226
240	0844	177
430	08D9	135
680	0E02	27
760	10D9	114
885	1289	53
END	1437	217

The listing:

```
1 '
3 '          CAVERN COPTER
5 '        BY JASON NANNEN
7 '
10 CLEAR500
11 'PLAYER CAN MODIFY GAME
    BY CHANGING THE
    FOLLOWING VARIABLES:
12 'S =BEGINNING CAVERN (0=LAST)
    AS=MAX LENGTH OF STALACTITES
    JS=MANEUVERABILITY OF COPTER
    GL=GOLD RANGE TO MIDSCREEN
    DR=CREATURE FREQUENCY
14 S=15
15 AS=72
16 JS=2
17 GL=60
18 DR=15
19 Z=RND(-TIMER)
20 CL=RND(8):IF CL=4 THEN 20 ELS
E CLSCL:FOR Z=103 TO 167 STEP 32
:PRINT@Z,STRING$(17,191);:NEXT
30 PRINT@137,"cavern";CHR$(128);
"copter";:POKE 1167,32
32 FOR Z=1 TO 40
33 PLAY"T12001V30"
35 PLAY"CDP"+STR$(RND(10)+30)
37 I$=INKEY$:IF I$="" THEN NEXT
40 DIM C(15,7),CB(15,7),DD(7,5)
50 PMODE 3,1:PCLS
60 CIRCLE(29,26),4,3,.9
80 DRAW"C3BM32,22L8BM-3,+2NU1NR1
NL2D2R4BM+0,+3R7C4"
92 LINE(150,150)-(158,156),PSET,
BF
94 PRESET(152,152):PRESET(156,15
2)
```

```
96 DRAW"C1BM152,155U1R4D1"
100 GET(16,22)-(32,29),C,G
102 GET(100,100)-(116,108),CB,G
104 GET(150,150)-(158,156),DD,G
105 S=S*2+8
106 IF CN>0 THEN 400
110 PRINT@323,"WANT INSTRUCTIONS
?  (Y/N)";
120 I$=INKEY$:IF I$="" THEN120
125 PRINT@323,STRING$(25,143+16*
(CL-1));
130 IF I$<>"Y" THEN 400
140 FOR Z=290 TO 356 STEP 32:PRI
NT@Z,STRING$(28,191);:NEXT
150 READ D$
160 IF D$="ZZZZZ" THEN 395
165 D$=STRING$(26,32)+D$
170 FOR Z=1 TO LEN(D$):PRINT@324
,MID$(D$,Z,24);
173 FOR ZZ=0 TO JOYSTK(0):NEXT
177 NEXT:GOTO 150
179 DATA "USE THE JOYSTICK TO CO
NTROL THE SPEED OF THESE INSTRUC
TIONS...                    "
180 DATA "YOUR MISSION IS TO REC
OVER A HIGHLY PRIZED ARTIFACT WH
ICH WAS STOLEN FROM YOUR LAND LO
NG AGO BY THE CREATURES THAT INH
ABIT THE CAVERNS OF KHADESHE. "
200 DATA "THE IMPERIAL WIZARD HA
S DETERMINED THAT THE ARTIFACT I
S HIDDEN IN THE MOST REMOTE CAVE
RN WHICH IS EGG-SHAPED AND IS VE
RY WELL GUARDED BY THE CREATURES
. "
210 DATA "YOU ARE EQUIPPED WITH
A HELICOPTER AND CAN CONTROL ITS
 VERTICAL MOVEMENT. "
220 DATA "IF YOUR COPTER CRASHES
 INTO ANYTHING RED, BE IT CAVERN
 OR CREATURE, YOU WILL DIE. "
230 DATA "HOWEVER, YOU MAY BE AB
LE TO SAVE YOURSELF FROM DESTRUC
TION BY USE OF YOUR LASER. PRESS
 THE FIRE BUTTON AND THE BEAM WI
LL DESTROY EVERYTHING IN ITS PAT
H. "
235 DATA "YOU HAVE THREE LASERS
FOR THE ENTIRE MISSION, BUT YOU
CAN'T USE ANY IN THE LAST CAVERN
. "
240 DATA "BUT WAIT--        THERE'
S SOMETHING GOOD ABOUT THE CAVER
NS--        THEY'RE LINED WITH G-O
-L-D !"
250 DATA "TO GET A CHUNK OF GOLD
, WHICH LOOKS LIKE A PLUS SYMBOL
 (+), RUN INTO IT WITH THE front
 OF YOUR COPTER. THERE IS MORE G
OLD IN THE FARTHER, MORE DIFFICU
LT CAVERNS. "
260 DATA "WHEN YOU GET A CHUNK O
F GOLD, YOUR SCORE WILL INCREASE
 BY THE NUMBER CAVERN YOU ARE IN
. FOR EXAMPLE, IF YOU GET A CHUN
K IN CAVERN 8, YOU ARE AWARDED 8
 POINTS. "
270 DATA "WHEN YOU GET TO THE EG
G-SHAPED CAVERN WHERE THE ARTIFA
CT LIES, THERE WILL BE HORDES OF
 CREATURES. "
280 DATA "TO GET THE ARTIFACT, U
SE THE SAME METHOD AS YOU USE TO
 GET THE GOLD. IF YOU DO GET THE
 ARTIFACT, YOU WILL BE AWARDED 5
00 POINTS AND YOU WILL BE INSTAN
TLY TELEPORTED BACK TO YOUR LAND
. "
290 DATA "IF YOU DO NOT GET IT,
YOU WILL DIE BECAUSE YOUR COPTER
 WILL CONTINUE INTO THE WALL OF
THE CAVERN. "
300 DATA "good luck "
310 DATA "ZZZZZ"
395 FOR Z=290 TO 356 STEP 32:PRI
NT@Z,STRING$(28,143+16*(CL-1));:
NEXT
400 CN=CN+1
410 SCREEN0,0
420 PRINT@266,;:PRINT USING"CAVE
RN ####";CN;
430 PRINT@330,;:PRINT USING"SCOR
E #####";SC;
435 S=S-2:IF S<8 THEN 900
440 PCLS:COLOR4,1
450 LINE(0,0)-(0,RND(10)+5),PSET
460 FOR Z=S TO 255 STEP S
470 A=RND(AS)+10
480 LINE-(Z-S,RND(10)+5),PSET
490 LINE-(Z-S/2,A),PSET
500 NEXT
510 LINE-(255,RND(10)+5),PSET:PA
INT(128,0),4,4
520 LINE(0,191)-(0,RND(10)+175),
PSET
530 FOR Z=S TO 255 STEP S
540 A=RND(AS)+100
550 LINE-(Z-S,RND(10)+175),PSET
560 LINE-(Z-S/2,A),PSET
570 NEXT
580 LINE-(255,RND(10)+175),PSET
590 PAINT(128,191),4,4
600 FOR Z=1 TO CN*2
610 IF RND(2)=1 THEN Y=RND(GL)+1
5 ELSE Y=RND(GL)+175-GL
620 CIRCLE(RND(256)-1,Y),3,2
630 NEXT
640 SCREEN1,0
650 Y=90:X=-XS+2
660 X=X+6:IF X>236 THEN 400
```

```
669 DUMMY=JOYSTK(0)
670 Y=Y+((INT(JOYSTK(1)/10))-3)*
JS
680 PUT(X,Y)-(X+16,Y+7),C,PSET
690 IF RND(DR)=1 AND X<170 THEN
XL=RND(36)+X+40:YL=Y+2:PUT(XL,YL
)-(XL+8,YL+6),DD,PSET:PLAY"O4T25
5V31BDAEGF"
700 IF PPOINT(X+18,Y)=4 OR PPOIN
T(X+18,Y+8)=4 OR PPOINT(X+4,Y-1)
=4 OR PPOINT(X+8,Y-1)=4 OR PPOIN
T(X+12,Y-1)=4 OR PPOINT(X+6,Y+8)
=4 OR PPOINT(X+12,Y+8)=4 THEN 77
0
710 FOR V=0 TO 8:IF PPOINT(X+20,
Y+V)<>2 THEN NEXT V:GOTO752
720 FOR Z=1 TO 8 STEP2:CIRCLE(X+
20,Y+V),Z,2:NEXT:SCREEN1,1
730 PLAY "T20003V5;1;V7;2;V9;3;V
11;4;V13;5;V15;6;V17;7;V19;8;V21
;9;V24;10;V29;11;V3104CCC"
740 SCREEN1,0:FOR Z=1 TO 8 STEP2
:CIRCLE(X+20,Y+V),Z,1:NEXT
750 SC=SC+CN:IF CN=500 THEN GOSU
B960:GOTO850
752 LA=PEEK(65280):IF F=3 OR (LA
<>254 AND LA<>126) THEN 760 ELSE
 F=F+1:FOR Z=1 TO 3:PLAY"T10001V
21C05D":NEXT
```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```
753 FOR Z=15 TO 270-X STEP 2
754 IF Z<255 THEN CIRCLE(X+8,Y+4
),Z,2,.3,.96,.05
755 IF Z>22 THEN CIRCLE(X+8,Y+4)
,Z-8,1,.3,.96,.05
756 NEXT Z
757 LINE(255,Y-25)-(255,Y+25),PR
ESET
760 PUT(X,Y)-(X+16,Y+7),CB,PSET:
GOTO660
770 DRAW"BM"+STR$(X+8)+","+STR$(
Y+4)+"C2NU8NE6NR8NF6ND8NG6NL8NH6
"
780 PLAY"T20001V31BBBV25AAAV20GG
GV15FFFV10EEEV5DDDCCC
784 B=0:GA=(RND(15)+5)/100
785 FOR Z=1 TO RND(20)+20
795 B=B+GA
805 IF B>1 THEN B=B-1
815 CIRCLE(X+8,Y+4),Z,RND(3)+1,1
,B,B+GA
825 NEXT
845 DI=1
850 PRINT@336,;:PRINT USING"####
#";SC;
860 IF DI=1 THEN PRINT@394,"YOU
DIED !!";:PRINT@448,"";:PLAY"V31
O1T1EC":GOTO980
870 PRINT@384,"  YOU RECOVERED T
HE ARTIFACT!
880 PLAY"O2V31T6CP4CCCP15T1G"
885 PRINT" THE EMPEROR CONGRATUL
ATES YOU!
890 PLAY"P15T7GGT4AFA03T3CP20002
T5CP25OCP25OCT1C"
895 FOR Z=1 TO 1000:NEXT:GOTO980
900 DR=1:CN=500:F=3
905 PCLS:COLOR4,1
910 CIRCLE(128,96),120,4,.65
915 PAINT(0,0),4,4
920 LINE(0,76)-(40,116),PRESET,B
F
925 COLOR2,1
943 LINE(188,158)-(196,162),PSET
,BF
947 DRAW"C1BM190,160R2NU1ND1R2"
950 GOTO640
960 ZZ=1:FOR Z=10 TO 190 STEP 8
965 ZZ=ZZ+.5
970 CIRCLE(X+8,Y+4),Z,2,1,.55,.5
77
975 PLAY"T4005V31;"+STR$(INT(ZZ)
)
977 NEXT:RETURN
980 PRINT@455,"PLAY AGAIN? (Y/N)
";
985 I$=INKEY$:IF I$="N" THEN CLS
:END:ELSE IF I$="Y" THEN RUN ELS
E 985
```

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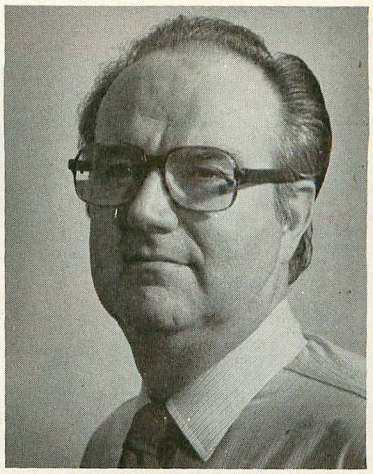

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16K ECB

the RAINBOW

The CoCo Open

By Mike Knolhoff

Championship Golf For The Color Computer

I'd much rather be out on the links playing golf, but up here in the north it's just too cold after the first of November. (You also tend to lose a lot of golf balls in the snow.) Usually during the winter, I just watch golf on TV and dream about hitting the little white ball. However, this year is different because I'm playing golf on my Color Computer.

Color Computer Championship Golf is a 16K Extended Color BASIC program that combines graphics, strategy, and a little bit of luck to make a challenging golf simulation. The program allows for up to four players. In order to properly set up the scorecard, each player's name must be kept to five letters or less. Once the player's names have been entered, the scorecard is displayed and the game begins.

Each hole is graphically displayed, and a blinking diamond identifies the ball position. On the graphic screen, the green area is the fairway, orange areas are sand traps, blue areas are water hazards, the white area at the end of the fairway is green, and all other white area is rough. The orange dot on the green is the cup, and the yardage of the hole is displayed on the screen.

Any time you are in the graphics mode you will stay there until you press the "X" key. Pressing the "X" key puts you in the text mode where you will select your club and direction of shot. The club selection screen allows you to choose a club on the basis of how far you want to hit the ball.

The number after the club name is the average distance the ball will go for that club. Next you must choose the direction you wish to hit the ball. Once you have done this, the computer will display the distance you have hit the ball based on a randomly selected percentage of the average distance of the club you selected. It also displays how much you hooked or sliced your shot based on a randomly selected distance depending on you club selection. Finally, the computer tells you where your ball has come to rest, for example fairway or sand trap. Then it's back to the graphics screen to display you new position in the hole, and you prepare for your next shot.

Once you find the green the computer takes over. The greens are divided into four "contours." Contour 1 is closest to the cup while contour 4 is farthest away. You have a better chance of one putting in contour 1, and a better chance of three putting in contour 4. But you will usually two-putt in any contour. The screen will not display your number of putts and your score for the hole, and it will be the next player's turn. Once all players have played a hole, an updated scorecard will be displayed.

Due to memory limitations on a 16K machine, there are only nine different graphic holes. These nine are repeated to make an 18-hole course. Since the graphics are in *PMODE 1*, I used the command *PCLEAR 2* to increase the available memory to 11559 bytes. Before you begin to type in or load the program, you must perform a *PCLEAR 2* to get enough memory. Even then after running the program there will be only a few hundred bytes of memory left.

It is not easy to break par with the program. It takes a while to get used to estimating graphic screen yardage, but as you do you will see your scores get better and better. But even when you have mastered this, an errant shot can land you in big trouble. There is quite a bit of strategy involved to position your shots to avoid water hazards and sand traps. And it's up to you to decide whether to "play it safe" or to "go for it." All in all, it may not beat playing the real thing, but it sure beats watching others play on TV.

(Mike Knolhoff is a science teacher currently pursuing a master's degree which emphasizes computer applications in education. He has been programming for over two years and has taught BASIC *and* LOGO *to junior high students. Mike's other interests include photography and, of course, golf.)*

Rainbow Check Plus

145 ..... 024O	44	2260 ..... 17B4	55
230 0582	145	2590 ..... 1A1E	118
420 ..... 07F0	1	2800 ..... 1CA6	213
605 ..... 0AC4	185	3160 ..... 1F45	77
730 ..... 0D54	203	3350 2161	144
925 1075	171	3740 ..... 23F3	252
2000 ..... 131C	196	END 2669	110
2135 1535	169		

```
5 CLEAR500:X=RND(-TIMER)
10 DIMS(4,18),PAR(18):A=1:DIMN$(
10)
20 PAR(1)=4:PAR(2)=3:PAR(3)=4:PA
R(4)=4:PAR(5)=5:PAR(6)=3:PAR(7)=
4:PAR(8)=5:PAR(9)=4:PAR(10)=4:PA
R(11)=3:PAR(12)=4:PAR(13)=4:PAR(
14)=5:PAR(15)=3:PAR(16)=4:PAR(17
)=5:PAR(18)=4
30 CLS3:PRINT@135," COLOR COMPUT
ER ";
35 PRINT@200," CHAMPIONSHIP ";
40 PRINT@268," GOLF ";
45 FORK=1TO1200:NEXTK
100 CLS
120 PRINT:PRINT"HOW MANY PLAYERS
 IN YOUR GROUP  (NAMES MUST BE <
=5 LETTERS)";:INPUT N
125 IF N>4THENPRINT"LIMIT OF FOU
R, PLEASE.":GOTO120
128 FORK=1TON
130 PRINT:INPUT"GOLFER'S NAME";N
M$(K)
135 IF LEN(NM$(K))>5THENPRINT"NA
ME TOO LONG.":GOTO130
140 NEXTK
145 PRINT"HERE IS THE SCORECARD.
":FORK=1TO600:NEXTK:GOSUB2000
155 LA$="BD4ND10E4R2F4D10U6NL10B
R4BU8":LR$="ND14R8F2D4G2L8R4F6BU
14BR4":LY$="BR16D2F5ND7E5U2BR4"
160 LD$="D14R6E4U6H4L6BR14":LS$=
"BD14R8E2U3H2L6H2U3E2R8":
165 YY$=LY$+LA$+LR$+LD$+LS$
170 N$(0)="BD4D6F4R2E4U6H4L2G4BU
4BR14":N$(1)="BR6NG4D14L4R8BR4BU
14"
175 N$(2)="BD4E4R2F4D4G3L4G3R10B
R4BU14":N$(3)="BD2E2R6F2D3G2NL5F
2D3G2L6H2BU12BR14"
180 N$(4)="BR8ND14G8R10BR4BU8":N
$(5)="NR10D6R7F3D2G3L7BR14BU14"
185 N$(7)="R10D2G10D2BR14BU14":N
$(9)="BD12F2R6E2U10H2L6G2D4F2R8B
R4BU8"
190 H=H+1:ON H GOTO 200,300,400,
500,600,700,800,900,1000,200,300
,400,500,600,700,800,900,1000
200 FORPL=1TON:GOSUB1500
202 BX=10:BY=180:X1=182:Y1=31:X2
=218:Y2=81:HX=194:HY=50
210 DRAW"BM0,180E8F12G8H12":PAIN
T(7,182),6,6
215 DRAW"BM11,182E40NR37U35E80R8
0F20D20G20L65G55"
220 PAINT(128,96),6,6
225 CIRCLE(200,56),16,5,1.5:PAIN
T(200,56),5,5:PSET(HX,HY,8)
230 CIRCLE(175,52),9,8,2.5:PAINT
(175,52),8,8
235 CIRCLE(142,95),30,7,.4:PAINT
(142,95),7,7:WX=190:WY=40
240 DRAW"BM118,176C7"+N$(4)+N$(1
)+N$(4)+YY$
245 CIRCLE(BX,BY),3,7:SCREEN1,1
250 GOSUB2150:GOTO2200
300 FORPL=1TON
305 CLS:GOSUB1500
310 LINE(190,80)-(202,100),PSET,
BF:BX=196:BY=90
```

```
315 CIRCLE(65,90),60,6,.6:PAINT(
70,90),6,6
320 LINE(190,90)-(120,90),PSET
325 CIRCLE(50,90),21,5,1.1:PAINT
(50,90),5,5
330 DRAW"BM75,92C8D6G14L6G4F4R10
E2OU8L8BU4U8H1OL6U6R1OF14D1OL8"
335 PAINT(78,95),8,8:PAINT(80,84
),8,8
340 PSET(58,84,8):HX=58:HY=84
345 DRAW"BM80,150C7"+N$(2)+N$(3)
+N$(1)+YY$
350 X2=72:Y2=113:X1=29:Y1=67
355 SCREEN1,1:GOSUB2150:GOTO2200
400 FORPL=1TON:GOSUB1500
410 LINE(60,10)-(80,22),PSET,BF:
BX=70:BY=16
415 CIRCLE(70,120),35,6,2:PAINT(
70,120),6,6
420 LINE(65,120)-(200,180),PSET,
BF
425 CIRCLE(185,150),35,6:PAINT(2
16,150),6,6
430 LINE(70,22)-(70,80),PSET
440 CIRCLE(185,150),16,5,1.5:PAI
NT(185,150),5,5
445 CIRCLE(86,124),10,8,1.5:PAIN
T(86,124),8,8
450 DRAW"BM154,100C7D30L8D30L8D3
OR12U22R8U30R8U38L12":PAINT(160,
106),7,7:WX=250:WY=145
455 PSET(182,156,8):HX=182:HY=15
6
460 X1=168:Y1=124:X2=202:Y2=176
470 DRAW"BM125,20C7"+N$(4)+N$(3)
+N$(5)+YY$
475 SCREEN1,1:GOSUB2150:GOTO2200
500 FORPL=1TON:GOSUB1500
510 LINE(0,100)-(12,120),PSET,BF
:BX=6:BY=110
515 LINE(12,110)-(100,110),PSET
518 CIRCLE(175,110),84,6,.55:PAI
NT(175,110),6,6
520 CIRCLE(228,110),16,5:PAINT(2
28,110),5,5
530 PSET(228,110,8):HX=228:HY=11
0
535 X2=248:Y2=130:X1=208:Y1=90
540 CIRCLE(150,110),16,8,1.8:PAI
NT(150,110),8,8
545 DRAW"BM40,20C7"+N$(3)+N$(7)+
N$(2)+YY$
550 SCREEN1,1:GOSUB2150:GOTO2200
600 FORPL=1TON:GOSUB1500
605 LINE(210,178)-(230,190),PSET
,BF:BX=220:BY=184
610 LINE(220,178)-(220,100),PSET
620 CIRCLE(220,85),30,6:PAINT(22
0,85),6,6
625 CIRCLE(100,35),100,6,.35:PAI
NT(100,35),6,6
630 DRAW"BM190,85H40E30F42":PAIN
T(190,75),6,6
635 CIRCLE(110,76),50,7,.66:PAIN
T(100,76),7,7:WX=20 :WY=18
640 CIRCLE(32,35),18,5,.9:PAINT(
32,35),5,5
650 DRAW"BM52,35C8U8H1OU6E4F16D2
4G16H4U6E1OU8":PAINT(58,35),8,8
660 DRAW"BM1O,17OC7"+N$(5)+N$(1)
+N$(9)+YY$
665 PSET(36,31,8):HX=34:HY=28
670 X1=14:Y1=17:X2=50:Y2=53
675 SCREEN1,1:GOSUB2150:GOTO2200
700 FORPL=1TON:GOSUB1500
705 LINE(50,50)-(70,62),PSET,BF:
BX=60:BY=56
710 LINE(60,62)-(60,125),PSET
720 CIRCLE(60,160),60,6,.55:PAIN
T(60,160),6,6
725 CIRCLE(64,166),22,5,.45:PAIN
T(64,166),5,5
730 DRAW"BM60,152C7R26E4R2E6U4H4
U4H4L6H4L2OH2L8G4L6G6L8G4L6G8F6R
2F4R8E6R8F8R8E2":PAINT(60,150),7
,7:WY=190:WX=60
735 CIRCLE(36,166),6,8,2.4:PAINT
(36,166),8,8
740 X1=40:Y2=154:X2=88:Y2=178
```


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```
745 PSET(64,160,8):HX=64:HY=160
750 DRAW"BM120,60C7"+N$(1)+N$(9)
+N$(4)+YY$
760 SCREEN1,1:GOSUB2150:GOTO2200
800 FORPL=1TON:GOSUB1500
805 LINE(242,50)-(254,70),PSET,B
F:BX=248:BY=60
810 DRAW"BM244,60L60H20L80G80G12
D20F12R30E82R36E20U2":PAINT(150,
60),6,6
820 CIRCLE(26,140),16,5:PAINT(26
,140),5,5
825 CIRCLE(26,116),12,8,.5:PAINT
(26,116),8,8
830 CIRCLE(50,140),6,8,2:PAINT(5
0,140),8,8
835 PSET(22,144,8):HX=22:HY=144:
X1=9:Y1=123:X2=43:Y2=157
840 DRAW"BM100,160C7"+N$(4)+N$(3
)+N$(2)+YY$
845 SCREEN1,1:GOSUB2150:GOTO2200
860 SCREEN1,1
900 FORPL=1TON:GOSUB1500
905 DRAW"BM0,10E10F6G10H6":PAINT
(2,10),6,6:BX=8:BY=8
910 DRAW"BM10,10F70E24R150D120G1
0L40H10U70L90G20L30U20E24":PAINT
(120,100),6,6
915 CIRCLE(150,150),40,7::PAINT(
154,150),7,7:WX=250:WY=190
920 CIRCLE(224,166),20,5,.6:PAIN
T(224,166),5,5:X1=202:X2=255:Y1=
142:Y2=180
925 CIRCLE(128,96),16,8,.6:PAINT
(128,96),8,8
930 CIRCLE(246,144),8,8,2:PAINT(
248,154),8,8
935 PSET(222,166,8):HX=222:HY=16
6
940 DRAW"BM100,20C7"+N$(5)+N$(4)
+N$(3)+YY$
950 SCREEN1,1:GOSUB2150:GOTO2200
1000 FORPL=1TON:GOSUB1500
1005 DRAW"BM222,18G8F12E8H12":PA
INT(224,28),6,6:BX=224:BY=28
1010 DRAW"BM224,28G46L30G30L100G
10D30F10R110E50U30":PAINT(50,120
),6,6
1015 CIRCLE(30,128),14,5,1.5:PAI
NT(30,128),5,5
1020 PSET(32,132,8):HX=32:HY=132
1025 DRAW"BM50,170C7U70E40R130D1
0L120G40D60L10":PAINT(54,160),7,
7:WX=20:WY=190
1030 X1=15:X2=45:Y1=106:Y2=150
1035 CIRCLE(140,110),8,8,2:PAINT
(140,110),8,8
1040 DRAW"BM16,12"+N$(3)+N$(9)+N
$(9)+YY$
1050 SCREEN1,1:GOSUB2150:GOTO220
```


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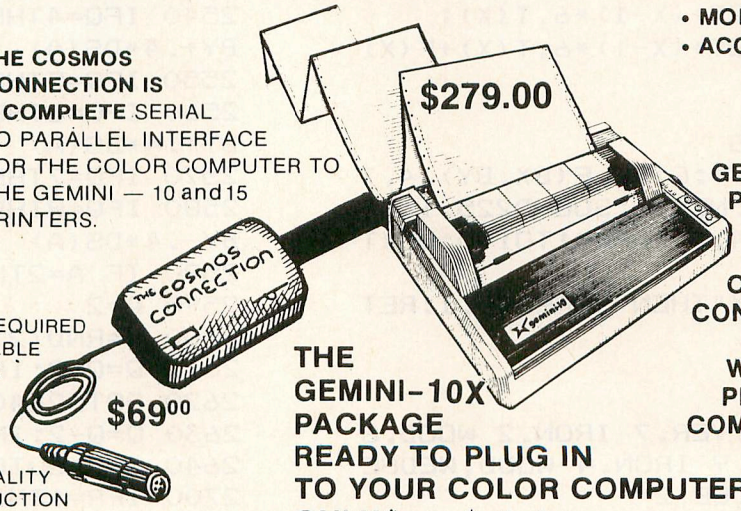

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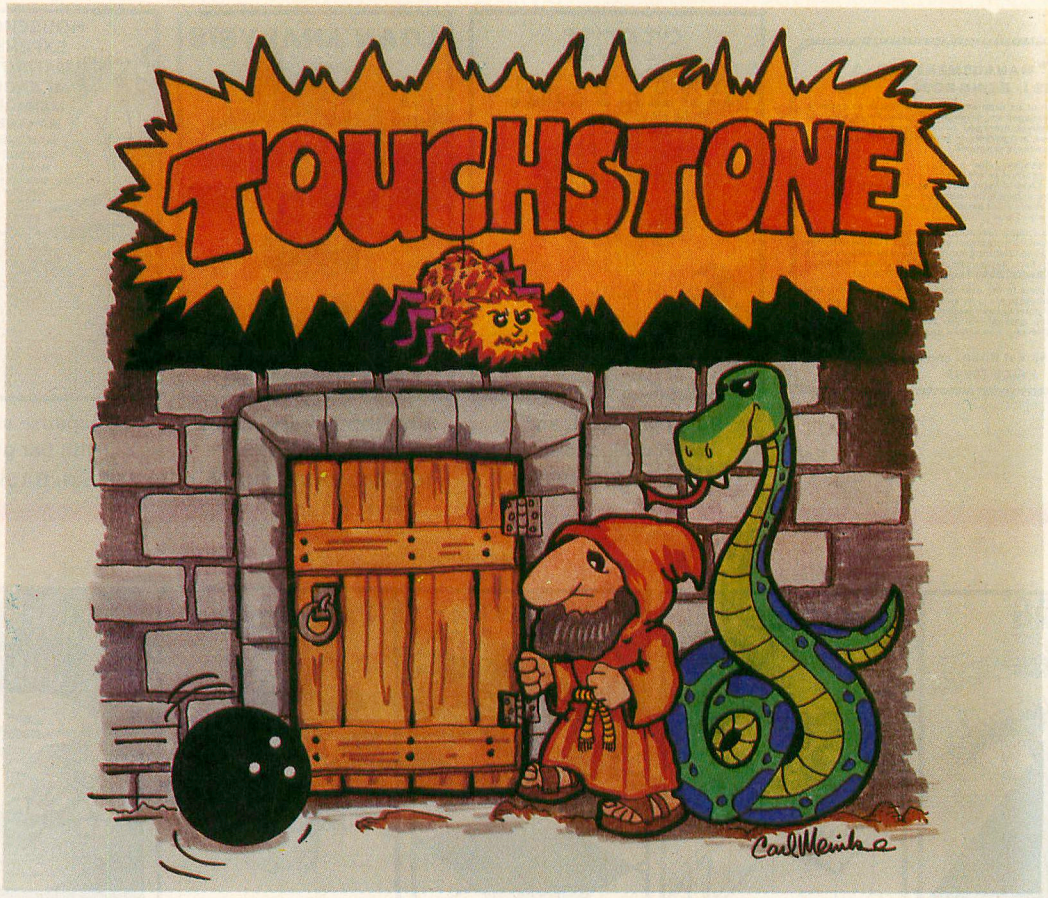
```
0
1500 S=0:CLS:PRINT@172,"HOLE"H;:
PRINT@234,NM$(PL)" IS UP.":FORK=
1TO600:NEXTK
1505 PMODE1,1:PCLS:SCREENO,1:COL
OR6,5
1510 RETURN
1999 H=18
2000 CLS:PRINT@33,STRING$(30,"-"
):PRINT@353,STRING$(30,"-"):PRIN
T@449,STRING$(30,"=")
2005 PRINT@0,"HOLE PAR ";:PRINTT
AB(9)NM$(1);TAB(15)NM$(2);TAB(21
)NM$(3);TAB(27)NM$(4)
2010 IFH>9THENZZ=8ELSE ZZ=-1
2020 FORK=2TO10
2030 PRINT@K*32,K+ZZ:PRINT@K*32+
4,PAR(K+ZZ)
2040 PRINT@K*32+10,S(1,K+ZZ):PRI
NT@K*32+16,S(2,K+ZZ)
2050 PRINT@K*32+22,S(3,K+ZZ):PRI
NT@K*32+28,S(4,K+ZZ):NEXTK
2065 PRINT@384,"OUT--36";:PRINT@
416,"IN---36":PRINT@481,"TOTAL";
:PRINT@384,"OUT--36";
2070 IFH=10+ZZ THEN2080
2075 FORK=1TO1200:NEXTK:RETURN
2080 IFH=18THEN2120
2090 PRINT@392,T(1);:PRINT@399,T
(2);:PRINT@406,T(3);:PRINT@413,T
(4);
2100 FORX=1TO4:F(X)=T(X):T(X)=0:
NEXTX
2110 FORK=1TO2000:NEXTK:RETURN
2120 FORX=1TO4
2125 PRINT@393+(X-1)*6,F(X);
2130 PRINT@425+(X-1)*6,T(X);
2135 PRINT@489+(X-1)*6,T(X)+F(X)
;
2137 NEXT X
2138 GOTO2138
2150 A$=INKEY$:CIRCLE(BX,BY),4,7
:FORK=1TO100:NEXTK:SOUND225,1:CI
RCLE(BX,BY),4,5:FORK=1TO100:NEXT
K
2160 IF A$="X"THEN SCREENO,1:RET
URN
2170 GOTO2150
2200 RESTORE
2201 DATA DRIVER,7 IRON,2 WOOD,8
 IRON,3 WOOD,9 IRON,4 WOOD,WEDGE
 1,5 WOOD,WEDGE 2
2202 DATA 1 IRON,WEDGE 3,2 IRON,
WEDGE 4,3 IRON,WEDGE 5,4 IRON,CH
IP 1,5 IRON,CHIP 2,6 IRON,CHIP 3
,7 IRON,CHIP 4,8 IRON,CHIP 5
2205 CLS:FORJ=1TO12
2208 READ C1$,C2$:M$=STR$(J)
2210 PRINT@J*32,M$;". ";C1$;(25-
J)*10,
2215 PRINTSTR$(J+12)". "C2$;(25-
(J+12))*10
2220 NEXT J:PRINT
2230 PRINT"(NO. AFTER CLUB IS AV
G. DIST.)"
2240 INPUT"WHICH CLUB (ENTER 0 F
OR HOLE)";CL:SOUND170,1
2250 IFCL=0THENSCREEN1,1:GOSUB21
50:GOTO2200
2260 IF PPOINT(BX,BY)=5AND CL<8T
HENPRINT"CAN'T USE THAT CLUB FRO
M THE    ROUGH.":FORK=1TO800:NEX
TK:GOTO2200
2270 IF PPOINT(BX,BY)=8AND CL<8T
HENPRINT"YOU CAN'T USE THAT CLUB
 FROM THESAND."FORK=1TO800:NEXTK
:GOTO2200
2280 OX=BX:OY=BY:C=(25-CL)*10:DC
=25-CL
2300 CLS:PRINT:PRINT
2310 PRINTTAB(5)"8 1 2"
2320 PRINTTAB(5)" \!/ "
2330 PRINTTAB(5)"7-X-3"
2340 PRINTTAB(5)" /!\ "
2350 PRINTTAB(5)"6 5 4"
2360 PRINT:PRINT"CHOOSE THE DIRE
CTION YOU WANT TOHIT THE BALL (0
 FOR HOLE)";:INPUT Q:SOUND160,1
2380 IF Q=0THENSCREEN1,1:GOSUB21
50:GOTO2300
2500 S=S+1:GOSUB4000:GOSUB4200:C
LS:A=1
2510 IFQ=1THENBY=BY-DS(A)*.54
2520 IFQ=2THENBX=BX+.4*DS(A):BY=
BY-.4*DS(A)
2530 IFQ=3THENBX=BX+DS(A)*.6
2540 IFQ=4THENBX=BX+.4*DS(A):BY=
BY+.4*DS(A)
2550 IFQ=5THENBY=BY+DS(A)*.54
2560 IFQ=6THENBX=BX-.4*DS(A):BY=
BY+.4*DS(A)
2570 IFQ=7THENBX=BX-DS(A)*.6
2580 IFQ=8THENBX=BX-.4*DS(A):BY=
BY-.4*DS(A)
2590 IF A=2THEN2700
2595 A=2
2600 R=RND(2):IFR=2THEN2630
2610 Q=Q+2:IFQ>8THENQ=Q-8
2620 GOTO2640
2630 Q=Q-2:IFQ<1THENQ=Q+8
2640 A=2:GOTO2510
2700 IFR=1THEND$="SLICED":GOTO27
20
2710 D$="HOOKED"
2720 PRINT:PRINT"YOUR SHOT WENT"
DS(1)"YARDS OUT"
2730 PRINT"AND IT "D$;DS(2)"YARD
S"
2740 IFBX<10R BX>254OR BY<1 OR B
Y>190THENPRINT"YOUR SHOT IS OUT
```



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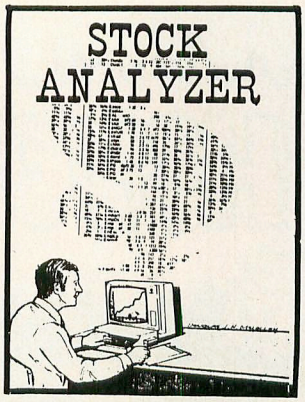

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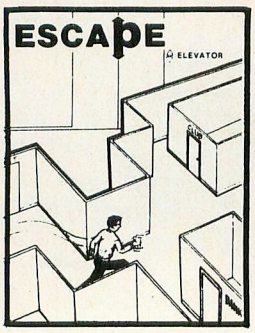

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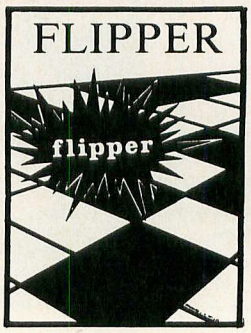

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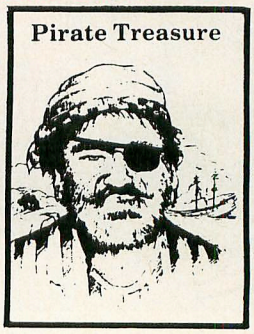

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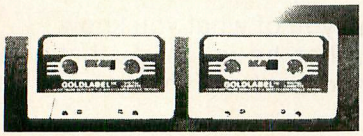

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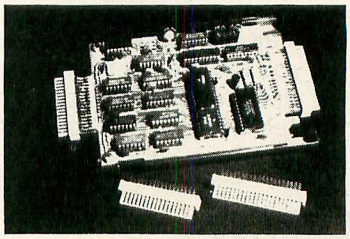

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```
OF BOUNDS--    LOSS OF STROKE AN
D DISTANCE.":SOUND20,5:BX=OX:BY=
OY:S=S+1:FORK=1TO1500:NEXTK:GOTO
2200
2750 IFPPOINT(BX,BY)=8AND ABS(BX
-HX)<5 AND ABS(BY-HY)<5 THEN3600
2760 IF PPOINT(BX,BY)=8THEN3000
2770 IF PPOINT(BX,BY)=7THEN3200
2780 IF PPOINT(BX,BY)=5 AND BX>X
1 AND BX<X2 AND BY>Y1 AND BY<Y2
THEN3300
2785 IF PPOINT(BX,BY)=5THENPRINT
"YOU ARE IN THE ROUGH. A 4 IRON
 IS THE LONGEST CLUB YOU CAN HIT
.":GOTO2800
2790 PRINT"YOU ARE IN THE FAIRWA
Y."
2800 FOR K=1TO1500:NEXT K
2810 SCREEN1,1:GOSUB2150:GOTO220
0
3000 PRINT:PRINT"YOU ARE IN A SA
ND TRAP. PRESS  enter TO SEE IF
 YOU ARE NEXT TO THE GREEN.":SOU
ND80,5:INPUTR$:SCREEN1,1:GOSUB21
50
3010 INPUT"IS TRAP NEXT TO GREEN
";R$
3020 IFR$="YES"THEN3100
3030 IFR$<>"NO"THEN3010
```


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b & b software


```
3040 SC=RND((5)-1)*10
3050 PRINT:PRINT"YOU CAN'T USE A
NY CLUB LONGER  THAN A FOUR IRO
N. AVG. DISTANCESWILL BE A LITTL
E SHORTER."
3060 FORK=1TO1500:NEXTK:SCREEN1,
1:GOSUB2150:GOTO2200
3100 PRINT:PRINT"RESULT OF SAND
TRAP SHOT:":S=S+1
3110 B=RND(20)
3120 IFB=1THENPRINT"BALL GOES IN
 CUP":GOTO3600
3130 IFB>1AND B<4THENPRINT"BALL
IS ON 1ST CONTOUR.":R=RND(15):GO
TO3460
3140 IFB>=4AND B<8THENPRINT"BALL
 IS ON 2ND CONTOUR.":R=RND(15):G
OTO3430
3150 IFB>=8AND B<15THENPRINT"BAL
L IS ON 3RD CONTOUR.":R=RND(15):
GOTO3400
3160 IFB>15THENPRINT"BALL IS ON
4TH CONTOUR.":R=RND(15):GOTO3370
3170 IFB=15THENPRINT"BALL IS STI
LL IN SAND!!":FORK=1TO600:NEXTK:
GOTO3100
3200 PRINT"YOU ARE IN A WATER HA
ZARD!! YOURBALL WILL BE DROPPED
BACK AND  YOU WILL BE CHARGED O
NE PENALTY STROKE."
3210 SOUND50,5:S=S+1
3220 IF BX<WX THEN BX=BX-15ELSE
BX=BX+15
3230 IFBY<WY THEN BY=BY-10ELSE B
Y=BY+10
3240 IF PPOINT(BX,BY)=7THEN3220
3250 FOR K=1TO1500:NEXTK:SCREEN1
,1:GOSUB2150:GOTO2200
3300 PRINT:PRINT"YOU ARE ON THE
PUTTING GREEN!!":FORK=1TO800:NEX
TK:SCREEN1,1:GOSUB2150
3310 P1=ABS(HX-BX):P2=ABS(HY-BY)
:R=RND(15)
3320 IF P1>P2 THEN P=P1:GOTO3330
3325 P=P2
3330 IFP<=5THENPRINT"CONTOUR 1":
GOTO3460
3340 IFP<=10THENPRINT"CONTOUR 2"
:GOTO3430
3350 IFP<=18THENPRINT"CONTOUR 3"
:GOTO3400
3360 PRINT"CONTOUR 4"
3370 IFR=1THENPRINT"YOU HOLED TH
E PUTT!!":S=S+1:GOTO3500
3380 IFR>12THENPRINT"YOU 3 PUTTE
D!":S=S+3:GOTO3500
3390 PRINT"YOU 2 PUTTED":S=S+2:G
OTO3500
3400 IFR<3THENPRINT"YOU HOLED TH
E PUTT!!":S=S+1:GOTO3500
```

```
3410 IFR>13THENPRINT"YOU 3 PUTTE
D!":S=S+3:GOTO3500
3420 GOTO3390
3430 IFR<5THENPRINT"YOU HOLED TH
E PUTT!!":S=S+1:GOTO3500
3440 IFR=15THENPRINT"YOU 3 PUTTE
D!":S=S+3:GOTO3500
3450 GOTO3390
3460 IFR<8THENPRINT"YOU MADE THE
 PUTT!":S=S+1:GOTO3500
3470 GOTO3390
3500 FORK=1TO1200:NEXTK
3510 S(PL,H)=S:T(PL)=T(PL)+S:GOS
UB3700
3520 NEXTPL
3530 GOSUB2000:GOTO190
3600 PRINT:PRINT"YOU HAVE HOLED
THE SHOT!!!":GOTO3500
3700 PRINT:PRINT"YOUR SCORE:"S(P
L,H)
3710 IF S(PL,H)=PAR(H)THENPRINT"
PAR"
3720 IFS(PL,H)=PAR(H)-1THENPRINT
"BIRDIE!"
3730 IFS(PL,H)=PAR(H)-2THENPRINT
"EAGLE!!"
3740 IFS(PL,H)=PAR(H)+1THENPRINT
"BOGEY"
3750 IFS(PL,H)=PAR(H)+2THENPRINT
"DOUBLE BOGEY"
3760 IFS(PL,H)>PAR(H)+2THENPRINT
"YECH!!!"
3770 FORK=1TO800:NEXTK:RETURN
4000 D1=RND(6):D2=RND(6):TD=D1+D
2
4010 IFTD=2THENDS(1)=C*.75
4020 IFTD=3THEN DS(1)=C*.8
4030 IFTD=4THEN DS(1)=C*.95
4040 IFTD=5THEN DS(1)=C*.85
4050 IFTD=6THEN DS(1)=C*.9
4060 IFTD=7THEN DS(1)=C
4070 IFTD=8THEN DS(1)=C*1.1
4080 IFTD=9THEN DS(1)=C*1.15
4090 IFTD=10THEN DS(1)=C*1.05
4100 IFTD=11THEN DS(1)=C*1.2
4110 IFTD=12THEN DS(1)=C*1.25
4120 DS(1)=DS(1)-SC:DS(1)=INT(DS
(1))
4130 SC=0:RETURN
4200 D1=RND(4):D2=RND(4):TD=D1+D
2
4210 IFTD=2THEN DS(2)=DC*2
4220 IFTD=3THEN DS(2)=DC*1.3
4230 IFTD=4THEN DS(2)=DC*.75
4240 IFTD=5THEN DS(2)=DC*0
4250 IFTD=6THEN DS(2)=DC
4260 IFTD=7THEN DS(2)=DC*.5
4270 IFTD=8THEN DS(2)=DC*1.6
4280 DS(2)=INT(DS(2)):RETURN
```

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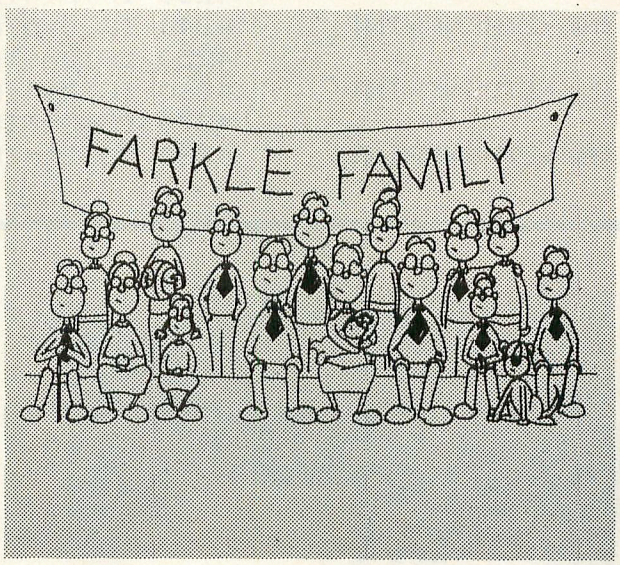
All in the Family Tree

By Richard Seaberg



When my wife's family decided to have a family reunion, my wife assumed some of the responsibilities for gathering the data to be used in creating a family tree. As she and her cousins dug into the project, meeting regularly to compile their lists of names, weddings, and birth dates, etc., I couldn't refrain from offering to input the mounting data into some sort of record-keeping program I would write for my Color Computer (my wife is Italian and has quite a large family).

As it turned out, I didn't accomplish too much in terms of easing family tree research. Instead, I decided to concentrate on a novel way to present the results. In my *Family Tree* program, all the required data is chronologically arranged and coded via *DATA* statements. The program presents one logical family "unit" at a time, waits for some predetermined interval, and then moves on to the next lateral or lower "family branch." It's designed to display its way "down" any given branch until the "tip" is reached and then revert to the next lateral family member's "limb" . . . that being the next youngest child of the top-of-the-tree parents. What I actually did was bring the computer and monitor to the reunion and let it run all day (it cycles around and reruns itself) where it proved to be quite an attraction.

(Dick Seaberg, a systems development department manager in a New England health insurance company, resides in Wallingford, CT. He and his 14-year-old son have collaborated on several family-type BASIC *games which are being marketed by Spectral Associates.)*

The version here, of course, contains a hypothetical and, I hope, fictitious tree of some strange intermarriages. Since a picture is indeed worth a thousand words, I would suggest that the data statements be typed in as shown before attempting to plug in your own family. Certainly, there are idiosyncrasies in any tree and I've attempted to include a good sampling here. Once you see how it works, you'll be able to hard-code in any special flashing-divorce signs, clone-notations, reincarnations or other circumstances unique to your own family heritage.

Starting at line 40 you'll notice that each *DATA* statement has a code number of from 1 to 9 as its first entry. Each code tells the program how to treat and display the data from the next read which, for simplicity, follows within the same *DATA* statement. For the sake of a 16K computer and ease of explanation, I'll assume the relative position (pun intended) of a grandchild to put things into perspective. Also, we'll assume that I'll be creating a tree commencing with my fraternal grandparents.

Code 1 = My Grandfather (full name)
Code 2 = My Grandmother (full name)
Code 3 = Their wedding year

The above data will display first at screen center.

Code 4 = Their children (my father plus any aunts uncles), first name, comma, year of birth (in order by year of birth)

There should be 11 Code 4 entries to force the grandparents' data to scroll to the top of the screen where they will remain throughout. Use additional blank statements (*DATA 4,,*) if needed. If more than 11 children were born, you'll have to repeat Codes 1 and 2 entries followed by the additional Code 4s. (See lines 90-180)

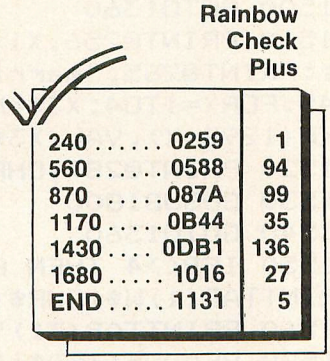
(Codes 5 and 6 exist only if a "4" married)
Code 5 = Full name of my parent, aunt or uncle
Code 6 = Full name of spouse of (5) above
Code 3 = (as previously described)
Code 4 = Their children (as previously described). This will be my family unit (myself, brothers/sisters) or aunt/uncle unit (cousins)

There is a maximum of six Code entries but no minimum. If more than six children were born, you'll have to repeat Codes 5 and 6 followed by the additional Code 4s.

Marriages and children of next generations (mine and on) are coded next similarly to last generation but with the following exception: Code 8 is used in place of Code 3. Its format is as shown in line number 350 and is used only after the first marriage of the generation. Its purpose is to display the prior generation's parent names just under the grandparents while the displays continue to the "tip" of the branch. Code 8 has another format (line 550) to blank out the prior generation's parent names. Code 9 is the last *DATA* statement and should be coded as shown.

Lines 1710-1790 are optional in that the "flag" they draw is of no known origin, but it allows for a logical place to insert your own emblem or title to dress up the running display. Line 1800 contains a waiting interval which is used between displays to allow enough time to view each screen. During preparation, you will want to shorten it to 300 or less. Key in the program as shown and save it to tape using *CSAVE FAMTREE.*

All of us have, at one time or another, probably considered gathering together certain family data such as that which this program needs in order to function. Here's your chance to follow through and have fun doing it.



The listing:

```
5 'family tree - D. SEABERG 1983
10 PCLEAR1:CLEAR500
20 CLS
30 'two who started it all
40 DATA 1,CHARLIE HATFIELD  1883
-1955
50 DATA 2,ELLIE MC COY  1887-196
2
60 'their wedding year
70 DATA 3,1906
80 'their offspring
90 DATA 4,ELLIE MAE,1909-1975
100 DATA 4,JIMMY,1911-1918
110 DATA 4,DORA,1913
120 DATA 4,BILLY BOB,1915
130 DATA 4,SUE ANN,1917
140 DATA 4,ORVILLE(JIMMY),1919
150 DATA 4,WILBUR,1921
160 DATA 4,LEROY,1923-1977
170 DATA 4,JERIMIAH,1926
180 DATA 4,BILLY JOE,1928
190 '***eleven child max
200 '****add data as follows to
210 '****reach max else repeat
220 '****codes 1&2 to exceed max
230 DATA 4,,
240 'secd generation
250 DATA 5,ELLIE MAE HATFIELD
260 DATA 6,DRUFUS PARTON
270 DATA 3,1930
280 DATA 4,CLEM,1932
290 DATA 4,LORRIE MAE,1935
300 DATA 4,BELINDA,1939
310 DATA 4,DOLLIE,1946
320 'thrd generation
330 DATA 5,CLEM PARTON
340 DATA 6,PRICILLA VAN DYKE
350 DATA 8,**ELLIE MAE & DRUFUS
PARTON***,1965
360 DATA 4,BECKY MAE,1966
370 'fourth generation
380 DATA 5,BECKY MAE PARTON
390 DATA 6,CHIG-NUK STRONGBOW
400 DATA 8,****PRICILLA & CLEM P
ARTON****,1983
410 DATA 4,TONTO BILLY,1983
420 DATA 5,LORRIE MAE PARTON
430 DATA 6,HYMAN ABROMOWITZ
440 DATA 8,**ELLIE MAE & DRUFUS
PARTON***,1953
450 DATA 4,IRVING,1953
460 DATA 4,ZELDA MAE,1956
470 DATA 4,MORRIS BOB,1958
480 DATA 4,SAMUAL LEE,1959
490 DATA 5,DOLLIE PARTON
500 DATA 6,PATRICK O'BRIEN
510 DATA 8,**ELLIE MAE & DRUFUS
PARTON***,1968
520 DATA 4,SHAWN BOB,1968
530 DATA 5,DORA HATFIELD
540 DATA 6,PASQUALE CAPONE
550 DATA 8,BLK,1941
560 DATA 4,CARMILINA MAE,1942
570 DATA 4,ROCCO EARL,1951
580 DATA 5,CARMILINA MAE CAPONE
590 DATA 6,JESUS CAVARRO
600 DATA 8,****DORA & PASQUALE C
APONE***,1960
610 DATA 4,BILLY JESUS,1962
```

```
620 DATA 4,BOBBY JUAN,1963
630 DATA 4,BELINDA ANGEL,1966
640 DATA 5,ROCCO EARL CAPONE
650 DATA 6,TRIXIE GLIK
660 DATA 3,1980
670 DATA 5,BILLY BOB HATFIELD
680 DATA 6,PAM ZYZCKSKI
690 DATA 8,BLK,1947
700 DATA 4,LAURA ANN,1948
710 DATA 4,LAURA LEE,1950
720 DATA 4,LAURA BOB,1950
730 DATA 4,LAURA MAE,1952
740 DATA 4,LAURA STAN,1953
750 DATA 4,LAURA BILLIE,1954
760 DATA 5,SUE ANN HATFIELD
770 DATA 6,SVEN OLSEN  SR
780 DATA 8,BLK,1940
790 DATA 5,SUE ANN HATFIELD
800 DATA 6,SVEN OLSEN  JR
810 DATA 8,BLK,1940
820 DATA 4,ELMER JOE,1941
830 DATA 4,GRETA MAE,1942
840 DATA 4,AXEL BERT,1946-1976
850 DATA 5,ELMER JOE OLSEN
860 DATA 6,CARRIE MC COY
870 DATA 8,*****SUE ANN & SVEN O
LSEN*****,1963
880 DATA 4,CORA,1965
890 DATA 4,NORA,1966
900 DATA 5,GRETA MAE OLSEN
910 DATA 6,ABDUL JEFFERSON
920 DATA 3,1964
930 DATA 4,THELMA RAE,1965
940 DATA 4,WESLEY LEE,1967
950 DATA 5,ORVILLE (JAMES) HATFI
ELD
960 DATA 6,GERLINDA VON EICHMANN
970 DATA 8,BLK,1941
980 DATA 4,GERTRUDE ANN,1941
990 DATA 4,FRITZ BOB,1944
1000 DATA 5,GERTRUDE ANN HATFIEL
D
1010 DATA 6,FRANCOIS DUPUIS
1020 DATA 8,*ORVILLE & GERLINDA
HATFIELD*,1962
1030 DATA 4,CYNTHIA EMMA,1963
1040 DATA 4,CHERYL ELLIE,1965
1050 DATA 4,RICHARD JIM,1969
1060 DATA 5,FRITZ BOB HATFIELD
1070 DATA 6,SING LING KWAN
1080 DATA 3,1968
1090 DATA 4,SHENG HO BOB,1975
1100 DATA 5,WILBUR HATFIELD
1110 DATA 6,BRUCE BOYINGTON
1120 DATA 8,BLK,1942
1130 DATA 5,JERIMIAH HATFIELD
1140 DATA 6,CARLOTTA RODRIGUIS
1150 DATA 3,1951
1160 DATA 4,JOSE JO,1957
1170 DATA 4,CARMINE RAE,1958
1180 DATA 4,CHIQUITA MAE,1960
1190 DATA 5,BILLY JOE HATFIELD
1200 DATA 6,BILLIE JO HATFIELD
1210 DATA 3,1954
1220 DATA 4,JOEY BILL,1967
1230 'next data must be at end
1240 DATA 9,END
1250 'graphic strings
1260 X$=STRING$(32,191):S$=STRIN
G$(8,191):X1$=S$+STRING$(16,32)+
S$
1270 Z$=LEFT$(X$,11)+CHR$(128)+"
children"+CHR$(128)+LEFT$(X$,11)
1280 U$=STRING$(9,143+32)
1290 T$=STRING$(8,207)
1300 W$=STRING$(14,140)
1310 R$=LEFT$(V$,30):X4$=STRING$
(16,128)
1320 V$=STRING$(31,32)
1330 'go print flag or crest
1340 GOSUB1720
1350 'main program
1360 READA:READA$
1370 ON A GOTO1380,1510,1510,155
0,1390,1390,1650,1680,1600
1380 CLS:GOSUB1610:GOTO1400
1390 GOSUB1800:GOSUB1610
1400 READA:READB$
1410 PRINT@160,X$
1420 PRINT@256,X$;:X=LEN(A$):Y=L
EN(B$)
1430 FORV=1TO X
1440 C$=RIGHT$(A$,V)
1450 PRINT@193,C$:NEXTV
1460 FORV=1TO Y
1470 C$=LEFT$(B$,V)
1480 PRINT@255-V,C$:NEXTV
1490 FORT=1TO300:NEXTT:B=A
1500 GOTO1360
1510 PRINT@256,X1$:PRINT@264,X4$
;:PRINT@265,"married";:POKE1297,
45:FORX=1TO4:X3$=MID$(A$,X,1):PO
KE(1298+X),VAL(X3$)+48:NEXTX
1520 PRINT@287,CHR$(191);
1530 GOSUB1800
1540 GOTO1360
1550 IFB<>4 THEN PRINT@256,Z$;:P
RINTTAB(1)W$;CHR$(136):GOTO1570
1560 PRINTTAB(31)" ";
1570 READD$:IFD$=""THEN 1580ELSE
PRINTTAB(1)CHR$(132);CHR$(140);"
 ";A$;:PRINTTAB(21)D$;
1580 B=A
1590 GOTO1360
1600 GOSUB1800:RESTORE:BB=0:GOTO
1340
1610 BB=BB+1:IFBB=2 THEN 1620ELS
E GOTO1630
1620 PRINT@96,X$;:PRINT@128,V$;
1630 PRINT@192,V$;:PRINT@224,V$;
```

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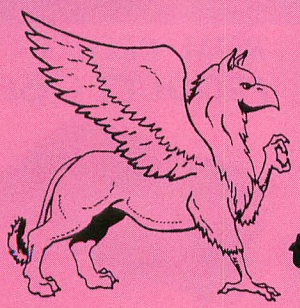
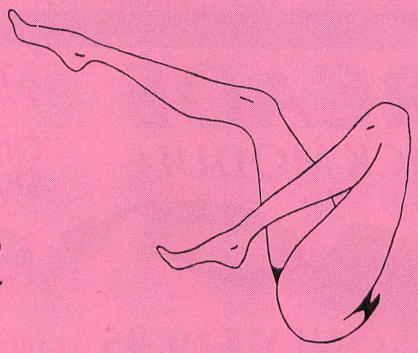


Guess the Animal

GUESS THE ANIMAL—A machine language, artificial intelligence program for the Color Computer. You must play it to believe it. Think of an animal, and this software will try to guess it using your clues. Watch this program learn, and use your clues. See it respond with questions. The longer you play, the smarter this program becomes. 16K $ 19.95 Tape, or $ 22.95 Disk. (Both Animals and Body Parts $ 29.95 Tape, or $ 32.95 Disk.)



Body Parts

(Bawdy Parts)

Have fun with artificial intelligence. This take-off on Animals is a riot. See if this program can guess the body-part you have in mind. The program learns, and responds with questions. If you give it x-rated clues, it turns into Bawdy Parts. 16K $ 19.95 Tape, or $ 22.95 Disk. (Body Parts and Animals $ 29.95 Tape, or $ 32.95 Disk.)

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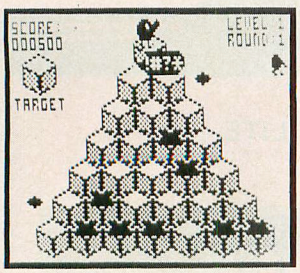

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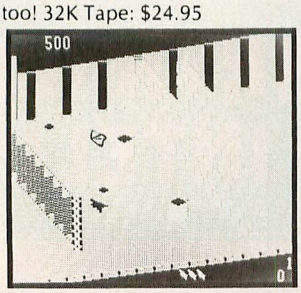
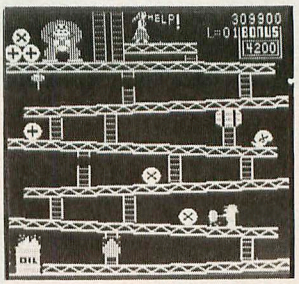


CUBIX

By Spectral Associates. Very much like the arcade smash! Jump little Cubix around the 3D maze trying to change the color of all the squares. With Death Globes, Discs, Snakes, etc. 32K Tape: $24.95



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Previously called 'Donkey King', you simply cannot buy a more impressive game for your CoCo. With 4 different screens and loads of fun! From Tom Mix Software. 32K Tape: $25.95

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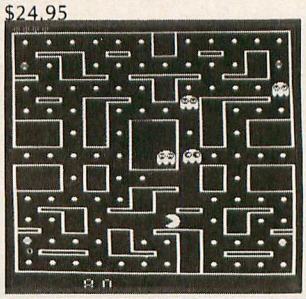

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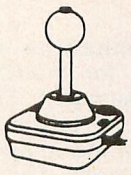

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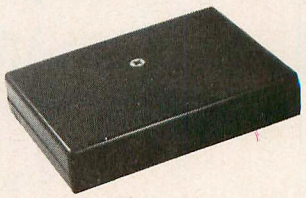

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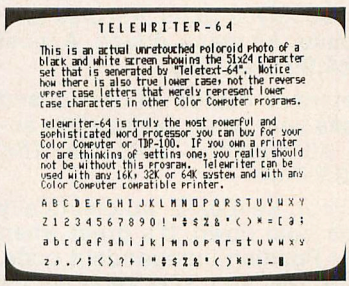

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The 96KX is a plug in cartridge that extends the capability of Color Computers. An output Connector is included for Disk Drives or Cartridges. A Programmable Interrupt Switch is included that allows the computer to be reset when the normal reset fails or run any ML Program. Extended Basic is not required & the cartridge works with all Color Computers. The software is always available as a HELP program and is called by a simple keyboard Command. Features include HEX to DECIMAL & DECIMAL to HEX Conversions, Storing and retrieving data in HEX, DECIMAL, ASCII, or VECTOR formats, Displaying Statement Numbers & Memory, allows changing Statement Numbers one at a time, quickly moves blocks of data, displays the Beginning, Ending, & Execution Addresses of ML Programs, Conditions for Stacking Programs, & much more. The 96KX is Menue oriented & User Friendly. For 64K Computers the 96KX allows Basic to be run in either of the two 32K Pages, or easily transfer information from one page to the other or within either page. One Year Warranty. 96KX CARTRIDGE $89.95

*** VIDEO REVERSER ***

The Video Reverser relieves eye strain from operating Color Computers. Its 3 modes of operation are (1) Reversed Bright Characters against a Dark Background, (2) All Capitals reversed for spotting spelling errors in text, & (3) the Normal power up display. The Video Reverser is a WIRED assembly that mounts onto the MC6847 (VDG) Chip. No soldering or experience is required. The different modes are selected by a 3 position toggle switch that mounts in a 1/4" hole. $19.95

*** DYNAMIC COLOR NEWS (Monthly Newsletter) ***

An Engineering Newsletter that explains in nontechnical terms how the Color Computer works. We will inform you of the latest accessories and developments in the Computer Field plus explain what You can do to improve Your Computer. We will also give operating hints to help you develop competence in writing Basic & Machine Language Programs. Included is a Q & A Section where we give replies to your questions plus much more. Receive discounts on our products. Cost $15 a year

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```
1640 PRINT@288,V$;:FORT=1TO6:PRI
NT:NEXTT:PRINTV$;:RETURN
1650 'spare for special uses (7)
1660 RETURN
1670 'if 'blk' then prt blank
1680 IFA$="BLK" THEN A$=R$
1690 PRINT@129,A$
1700 READA$:GOTO1510
1710 'optional flag or fmly name
1720 CLS0:FORT=68TO356STEP32
1730 PRINT@35,CHR$(229);CHR$(239
);
1740 PRINT@T,CHR$(234);S$;U$;T$;
1750 NEXTT
1760 PRINT@202,"H A T F I E L D"
;
1770 PRINT@111,"T H E";:PRINT@30
0,"F A M I L Y";:PRINT@334,"T R
E E";
1780 FORT=388TO484STEP32
1790 PRINT@T,CHR$(234);:NEXTT
1800 FORT=1TO3000:NEXTT:RETURN
```

Important Announcement

```
10 CLS RND(8)
20 DATA 68,79,78,39,84,32,77,73,
83,83
30 FOR X = 1 TO 10
40 READ A
50 PRINT @ 234+X, CHR$(A);
60 SOUND RND(255),1
70 NEXT
80 DATA 82,65,73,78,66,79,87,70,
69,83,84
90 FOR X =1 TO 11
100 READ A
110 PRINT @ 233+X, CHR$(A);
120 SOUND X*10,1
130 NEXT
140 DATA 67,65,76,73,70,79,82,78
,73,65,32,83,84,89,76,69,33,32
150 FOR X = 12 TO 29
160 READ A
170 PRINT @ 251+X, CHR$(A);
180 SOUND RND(255),1
190 NEXT
200 DATA 76,79,78,71,32,66,69,65
,67,72
210 FOR X = 30 TO 39
220 READ A
230 PRINT @ 333+X, CHR$(A);
240 SOUND RND(255),1
250 NEXT
260 DATA 70,69,66,82,85,65,82,89
,32,49,55,45,49,57,33
270 FOR X = 40TO54
280 READ A
290 PRINT @ 128+X, CHR$(A);
300 SOUND RND(255),1
310 NEXT
320 FOR XX=1 TO 3000:NEXT
330 RUN
```

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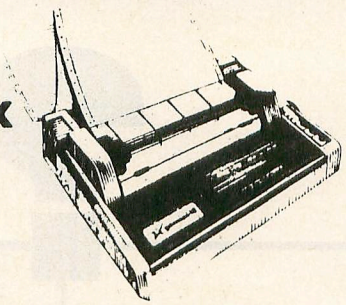

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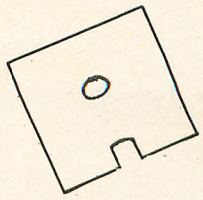

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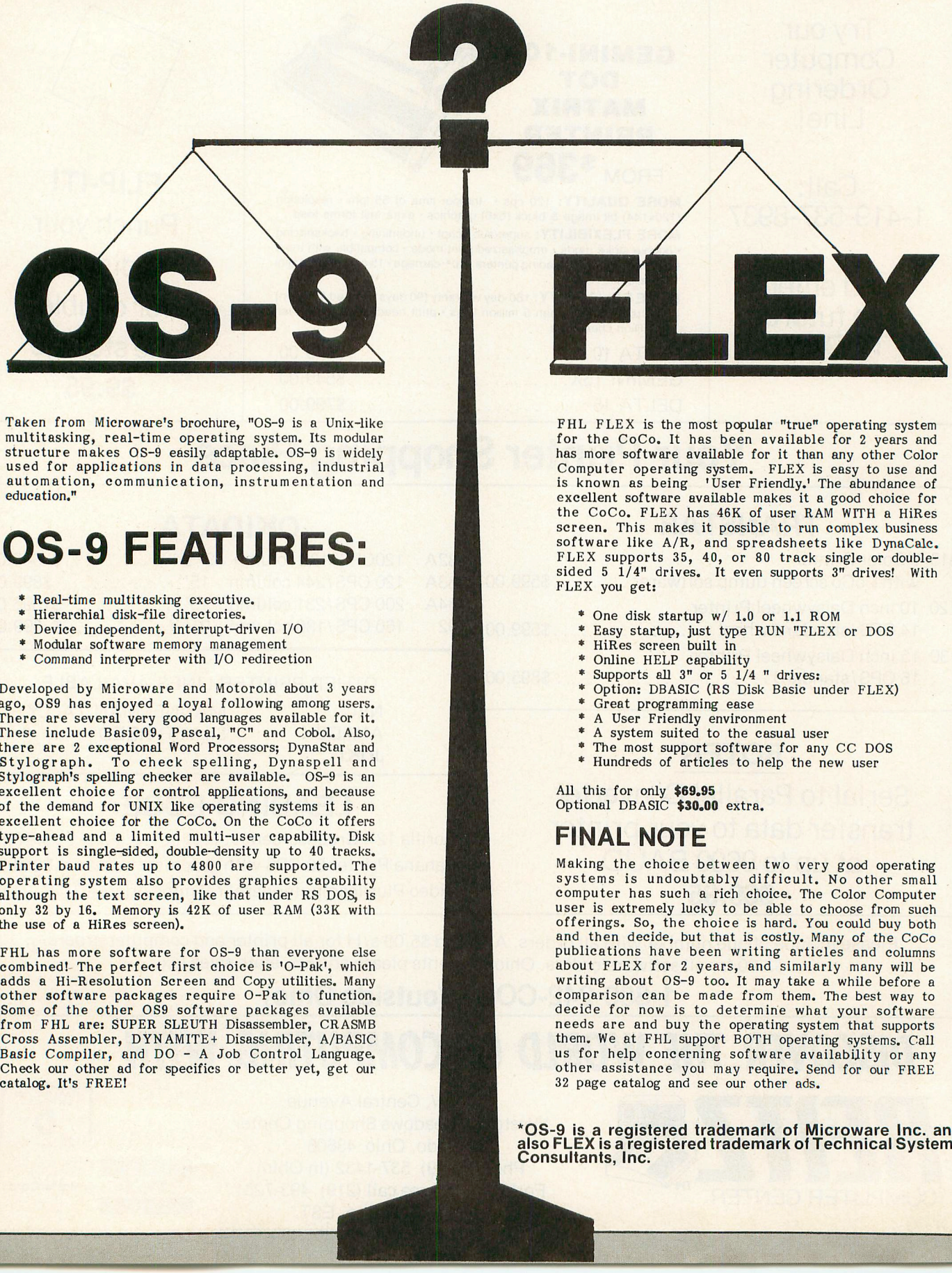
WHICH "WEIGH" TO GO?



Taken from Microware's brochure, "OS-9 is a Unix-like multitasking, real-time operating system. Its modular structure makes OS-9 easily adaptable. OS-9 is widely used for applications in data processing, industrial automation, communication, instrumentation and education."

OS-9 FEATURES:

* Real-time multitasking executive.
* Hierarchial disk-file directories.
* Device independent, interrupt-driven I/O
* Modular software memory management
* Command interpreter with I/O redirection

Developed by Microware and Motorola about 3 years ago, OS9 has enjoyed a loyal following among users. There are several very good languages available for it. These include Basic09, Pascal, "C" and Cobol. Also, there are 2 exceptional Word Processors; DynaStar and Stylograph. To check spelling, Dynaspell and Stylograph's spelling checker are available. OS-9 is an excellent choice for control applications, and because of the demand for UNIX like operating systems it is an excellent choice for the CoCo. On the CoCo it offers type-ahead and a limited multi-user capability. Disk support is single-sided, double-density up to 40 tracks. Printer baud rates up to 4800 are supported. The operating system also provides graphics capability although the text screen, like that under RS DOS, is only 32 by 16. Memory is 42K of user RAM (33K with the use of a HiRes screen).

FHL has more software for OS-9 than everyone else combined! The perfect first choice is 'O-Pak', which adds a Hi-Resolution Screen and Copy utilities. Many other software packages require O-Pak to function. Some of the other OS9 software packages available from FHL are: SUPER SLEUTH Disassembler, CRASMB Cross Assembler, DYNAMITE+ Disassembler, A/BASIC Basic Compiler, and DO - A Job Control Language. Check our other ad for specifics or better yet, get our catalog. It's FREE!

FHL FLEX is the most popular "true" operating system for the CoCo. It has been available for 2 years and has more software available for it than any other Color Computer operating system. FLEX is easy to use and is known as being 'User Friendly.' The abundance of excellent software available makes it a good choice for the CoCo. FLEX has 46K of user RAM WITH a HiRes screen. This makes it possible to run complex business software like A/R, and spreadsheets like DynaCalc. FLEX supports 35, 40, or 80 track single or double-sided 5 1/4" drives. It even supports 3" drives! With FLEX you get:

* One disk startup w/ 1.0 or 1.1 ROM
* Easy startup, just type RUN "FLEX or DOS
* HiRes screen built in
* Online HELP capability
* Supports all 3" or 5 1/4 " drives:
* Option: DBASIC (RS Disk Basic under FLEX)
* Great programming ease
* A User Friendly environment
* A system suited to the casual user
* The most support software for any CC DOS
* Hundreds of articles to help the new user

All this for only **$69.95**
Optional DBASIC **$30.00** extra.

FINAL NOTE

Making the choice between two very good operating systems is undoubtably difficult. No other small computer has such a rich choice. The Color Computer user is extremely lucky to be able to choose from such offerings. So, the choice is hard. You could buy both and then decide, but that is costly. Many of the CoCo publications have been writing articles and columns about FLEX for 2 years, and similarly many will be writing about OS-9 too. It may take a while before a comparison can be made from them. The best way to decide for now is to determine what your software needs are and buy the operating system that supports them. We at FHL support BOTH operating systems. Call us for help concerning software availability or any other assistance you may require. Send for our FREE 32 page catalog and see our other ads.

***OS-9 is a registered trademark of Microware Inc. and also FLEX is a registered trademark of Technical Systems Consultants, Inc.**

FHL Color FLEX

FLEX is the disk operating system you need to run all this software and more on your 64K Color Computer! A single-user system designed to be very powerful yet very easy to learn to use. FLEX features dynamic filespace allocation, random and sequential file accessing, batch job type program entry, user startup facility, automatic drive searching, file dating, space compression, complete user environment control, English error messages, smooth scrolling and much more!

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LANGUAGES

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Radio Shack 1.0 Disk Basic adapted to work with FHL Color FLEX: **$30.00**

TSC Extended BASIC

TSC XBASIC for CoCo FLEX: **$100.00**

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Use the Macro Cross-Assembler and any of the following CPU Personality Modules (CPM's) to assemble that CPU's Source code into OS9, FLEX, Motorola S1-S9 or INTEL-HEX formatted Object code files. Available CPM's: Motorola 6800-2-8, 6801-3, 6805, 6809, Mostek 6502, RCA 1802, INTEL 8080-5, ZILOG Z-80.

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Examine and modify or disassemble binary program files into source code format. Object code for 6800, 01, 02, 03, 05, 08, 09, or 6502 may be processed.

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CoCo OS9:	**$49.95**
CoCo FLEX:	**$50.00**
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DYNAMITE +

Easy to use disassembler complete with cross-reference generator, and label files maintained in text form only.

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Set up to 32 breakpoints. A must for anyone serious about Assembly Language programming!

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FHL FLEX Color Utilities

This combination of Toolkit #2 and Extended utilities for FLEX includes: REPAIR, SCAN, REPLACE, INIT, USERINFO, LOAD, SAVETEXT, READTEXT, DISKDUMP, LNKMAT, SEGMAT, MAP, AND DINFO.

Object only:	**$50.00**
w/Source:	**$75.00**

TSC FLEX UTILITIES

This set of FLEX utilities includes memory dump, prompting delete, extended directory display, binary program mapper and 13 more!

$75.00

TSC FLEX DIAGNOSTICS

Examine and repair your FLEX disks. Recover data from a disk with a damaged directory.

CoCo FLEX version: **$75.00**

APPLICATIONS SOFTWARE

DYNASTAR SCREEN EDITOR Word Processor

This extremely powerful, menu-driven Word Processing system is composed of Dynastar, the Text Generator and Dynaform, the Text Formatter/Mail Merge program.

DYNASTAR: for FLEX or OS9:	**$ 49.95**
DYNAFORM: for FLEX or OS9:	**$ 49.95**
Purchased together:	**$ 90.90**

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Use with Dynastar or Stylograph for a complete word processing system. Now with new LOOKUP command!

CoCo FLEX or OS9 versions: **$59.95**

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16K
ECB

A Valentine Printer Mystery

This is the fourth installment in a continuing series of short 'Printer Mysteries' which began in November.

By Michael J. Himowitz and Julius Nelson

Here's the latest printer mystery for those who have the *Printer Artist* program from the November issue of *the Rainbow*. Of course, we won't tell you what it is, other than to say that it's an appropriate February epistle for your girlfriend, boyfriend, wife or husband.

Since the first *Printer Art* first appeared in *Rainbow,* we've heard from a couple of people with problems. In one case, a reader had trouble with the Halloween witch. We couldn't duplicate the problem ourselves, but after an exchange of correspondence we found out that his CoCo was actually adding wrong. Has anybody else had this experience?

Also, some folks with non Radio-Shack printers (like my Gemini 10), and some with the new DMP-120, occasionally find that the printer drops the first character in a line. One reader said Radio Shack told him the trouble was with the computer's output. Anyway, you can solve this problem by adding a half-second line delay. Just *POKE 151,128:POKE 152,0* before *RUNning* the program.

To create the drawing below, run the *Printer Artist* program and type in the characters as you see them listed here, one line at a time. For example, if a line reads "23sp 16M 14:" you should strike the space bar 23 times, strike the "M" key 16 times and strike the colon key 14 times.

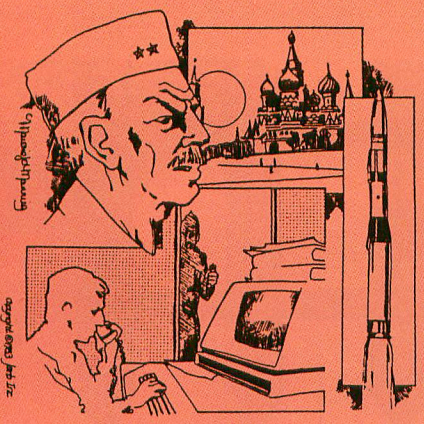
For those interested in more sophisticated art, a complete four-program *Printer Artist* development system is available from Federal Hill Software, 825 William St., Baltimore, MD 21230.

LINE

1 19sp 2M
2 12s 6I 4M 24sp 4I 1M 1I 1M
3 9sp 10I 5M 17sp 8I 2M 1I 2M 1I 1M
4 6sp 15I 3M 2I 2M 11sp 10I 2M 1I 1M 1I 3M 2I
5 4sp 18I 3M 2I 1M 2sp 1M 5sp 12I 8M 1I 3M
6 3sp 19I 11M 14I 11M 3I
7 2sp 21I 10M 13I 13M 3I
8 1sp 22I 13M 8I 11M 8I
9 24I 13M 5I 10M 12I
10 24I 13M 2I 11M 14I
11 25I 23M 16I
12 25I 21M 18I
13 26I 31M 7I
14 26I 28M 2I 3M 2I 3M
15 26I 35M 3I
16 27I 2M 1I 32M 2I
17 1sp 28I 14M 2I 14M 4I
18 1sp 25I 15M 3I 13M 6I
19 2sp 23I 2M 1: 11M 5I 6M 12I
20 2sp 16I 4sp 3I 13M 24I
21 3sp 11I 10sp 3M 34I
22 3sp 9I 12sp 1V 1sp 35I
23 4sp 6I 17sp 33I
24 5sp 5I 20sp 29I
25 6sp 6I 20sp 26I
26 7sp 7I 20sp 23I
27 8sp 8I 16sp 24I
28 9sp 9I 12sp 25I
29 10sp 10I 8sp 26I
30 11sp 11I 4sp 27I
31 12sp 40I
32 14sp 36I
33 15sp 34I
34 16sp 32I
35 17sp 30I
36 19sp 26I
37 21sp 22I
38 23sp 18I
39 25sp 14I
40 27sp 10I
41 29sp 6I
421 31sp 2I

(Mike Himowitz is a Washington correspondent for the Baltimore Evening Sun and proprietor of Federal Hill Software. Julius Nelson is one of the world's foremost authorities on typing education and inventor of the craft known as "Artyping.")

*TALKING PROGRAMS



The Final Countdown

NEW

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(by Bill Cook)

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** All JARB Software talking programs require the Spectrum Speaker to work. Look for more talking programs to come.*

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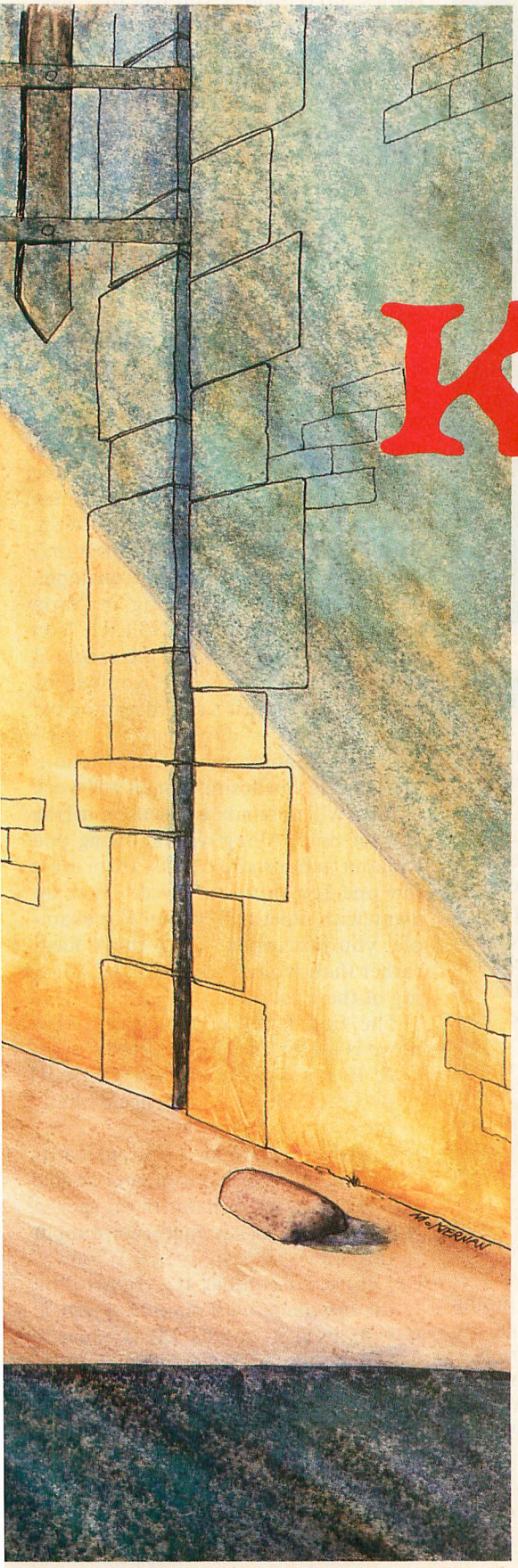


THE AMAZING ADVENTURES OF KARRAK

Conquest of the Castle Caverns

By Gregory Clark

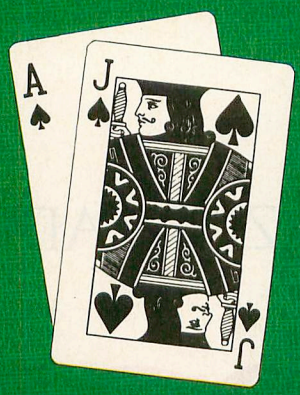
Karrak is a warrior in the kingdom of Blenfor. His strength and courage have reached almost legendary proportion, in spite of his relatively young age of 26 cycles.

He has heard of strange things going on in the area of an old castle located in the Eastern Mountains. So old is this castle that the original owner's name has been forgotten. All that is known for sure is that no one has lived there since his death.

Recently people, livestock and materials have been reported missing in that area. The reports have been coming at an ever-increasing rate. Along with the reports are rumors to the effect that an evil entity has taken up residence in the old castle and has been sending forth terrible creatures into the countryside to pillage.

Karrak arrives at the entrance of the old castle. Vines and brambles have all but overgrown the walls. There is no sign of recent passing in the dirt leading to the entrance. Karrak takes note that, as he steps forward and enters, the sun disappears behind an especially dark cloud.

B L A C K J A C K P R O



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Read about BLACKJACKPRO on page 145

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S K I L L W A R E

INSTRUCTIONS

Karrak is a four-part Adventure game written for the 16K Color Computer in non-Extended BASIC.

There are six listings for the game. To assemble them into four Adventures, follow these steps:

Type in listing 1 *(KAR-1)*.

*If you have Extended BASIC, now substitute listing 6 *(KAR-6)* for lines 200-240 in listing 1. This is a faster search routine and will speed up the playing considerably.

Make four copies of listing 1 on four different tapes. These will comprise the base of the four Adventures. Make sure of your typing at this point, as a mistake here will appear in all four Adventures and will cause you to have to bug out four programs instead of one.

With listing 1 in memory, type in listing 2 *(KAR-2)*. Save the result on tape and label as Game 1.

Turn off your CoCo and then load your next copy of listing 1 into memory. Now enter listing 3 *(KAR-3)*. Save the result on tape and label as Game 2.

Turn off your CoCo and then load your next copy of listing 1 into memory. Now enter listing 4 *(KAR-4)*. Save the result on tape and label as Game 3.

Turn off your CoCo and then load your last copy of listing 1 into memory. Now enter listing 5 *(KAR-5)*. Save the result on tape and label as Game 4.

You now have four separate 16K Adventures, but — before you load in Game 4 and attempt to solve it in record time — read on. Karrak's four Adventures must be played in order. Each time a section is completed, the program will instruct you in making a data tape. This tape must be entered when you start Games 2-4. This allows for two things while it is not a "game in progress" save, it allows you to finish one section and not have to keep playing. You can come back at anytime and pick up where you left off, at least by game. It prevents someone from starting on Game 4 and cheating him/herself out of the first three games.

Karrak is written for the beginning Adventurer; the first two games are meant to be an instructional experience. Parts three and four get down to some real Adventuring. As a word of caution, don't hurry through each section; Adventuring is not a race. In fact, you can get from one section to another without getting everything you may need in a later game.

Karrak is an interactive Adventure. What I mean is, if you just move about from room to room and don't do anything, all you will get is death. You have to imagine you are Karrak. Look at things, take them if you feel they may help you later, try different actions. This program has a built-in vocabulary of actions and objects. It would be unrealistic for me to believe that you will not notice them as you type in the listings. Don't be ashamed to write them on a piece of paper for future reference, you should have fun with this program — not heartburn. The whole premise of an Adventure is to put the actions and objects together at the right time, in the right order and solve the puzzle.

When you load in Game 1 you will see a title page and then a screen of information. You will be asked what you wish to do. Remember, you are Karrak, not the person who just typed in the listings. All you have to work with now is what you have on the screen. You may now attempt to do anything you wish, within the confines of the program's vocabulary. You may, for example, drop your sword by typing in "drop sword" and pressing [ENTER]. You will then be shown what the result of this action is. In this case, you will be advised that there is a sword now on the ground. (Hint — don't leave it there.) You may use any combination of actions and objects you desire. Not all will work as most will not make any sense until the correct time. Along with allowing you to input actions and obects, there are a few one-key entries allowed. These do away with repetitive typing. For example, you just input "E" to move East, rather than typing "Move East." A listing of these follows:

The first letter of the direction to move is all that need be entered.

& Restores the screen if the [CLEAR] or [BREAK] key are accidentally pressed.

[Gives the room description, if any.

↑ Gives a list of items in your hands.

← Gives a list of items in the sack.

] Gives Karrak's strength (more about this later).

! Is used in combat. It is equal to "hit the opponent with major weapon."

= Is used in combat. It is equal to "hit the opponent with minor weapon"

Now, some answers to those questions. If Karrak's strength reaches zero, he is dead and the game ends — you have to start over and try again. A major weapon is a sword or mace, a minor weapon is a dagger or a hand axe. In combat, if you have two major wea-

pons in hand, the sword is the weapon used. In other words, have only one of each type when fighting, or you will not gain anything. If you find you are confronted by an enemy, just enter "!" or "=" and the results of the action will be displayed. Choice of weapons may be crucial. As an example, in real life, if you faced a fire, a handful of tissues may be fine for a runny nose, but I'd rather use the extinguisher. You have to choose based on the opponent. This may mean a few deaths, but all you have to do is rerun the program to get another chance.

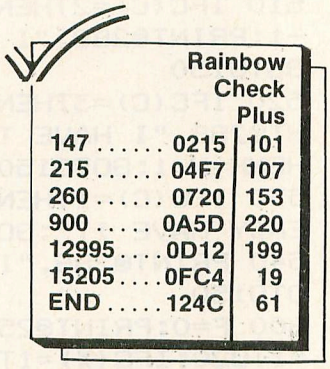
One more word of advice — this is an Adventure, based on a make-believe character in an imaginary setting — don't be surprised if a few touches of magic are thrown at you.

Karrak is ready to step into the castle; imagine yourself as a mighty warrior and step in with him.

(Greg Clark works for New York Telephone Co. and in his spare time enjoys writing Adventure programs. His wife, Ruth, is quietly supportive of the time spent at his hobby.)

Program Summary

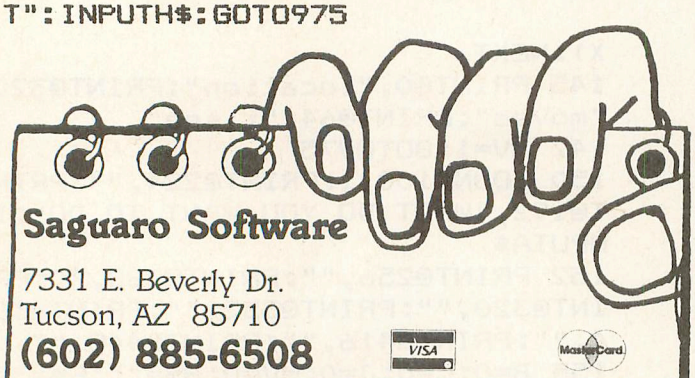
100 Dimensions
105 Read Data
110 Variable Setups
140 Introduction
150 Main Input Line
155 Variable Cancels
200-215 Search For Action
220-230 Search For Object
247- Search For Particular Actions & Objects
300 Look In Knapsack Routine
400 Put In Knapsack Routine
500 GET Routine
600 LIST Routine
700 DROP Routine
950 Change Location On Moves
975 Assign Next Line On Basis Of Value Of "P"
1000 Moves For Value P 101-125
2000 Actions For Value P 201-225
3000 Moves For Value P 201-225
4000 Actions For Value P 201-225
5000 Moves for Value P 301-325
6000 Actions for Value P 301-325
12990 Actions Not Found Trap
15000 Reassign Dropped & Left Behind Objects Value of P
1510 Set allowable Moves On Basis Of Value of O & T
20000 Data Lines
25000 Set Up For Variable Values To Tape
26000 Set Up For Variable Values From Tape



Listing 1

```
1 REM karrak-WRITTEN BY GREGORY
CLARK,122 MALE AVE,SYRACUSE,NY
13219/315-487-8406/16K BASIC
102 X=RND(-TIMER)
105 FORX=1TO20:READB$(X):NEXT:FO
RX=1TO20:READC$(X):NEXT:FORX=1TO
20:READD$(X):NEXT:FORX=1TO25:REA
DA2$(X):NEXT:FORX=1TO25:READA1$(
X):NEXT:FORX=1TO25:READA3$(X):NE
XT:FORX=1TO12:READKA(X),AK(X):NE
XT
106 N$="KARRAK IS DEAD"
107 IFAK(12)<>49THEN26000
140 FORX=1030TO1510STEP32:FORY=0
TO5:BK=Y+1:POKEX+Y,AK(BK):NEXTY,
X:FORX=1043TO1260STEP31:FORY=0TO
5:BK=Y+1:POKEX+Y,AK(BK):NEXTY,X:
FORX=1292TO1523STEP33:FORY=0TO5:
BK=Y+1:POKEX+Y,AK(BK):NEXTY,X:FO
RX=1TO4000:NEXT
143 CLS:FORX=1TO12:POKEKA(X),AK(
X):NEXT
145 PRINT@0,"location":PRINT@32,
"moves":PRINT@64,"i see"
147 MV=1:GOTO975
150 SOUND100,1:PRINT@224,"":PRIN
T@192,"WHAT DO YOU WANT TO DO":I
NPUTA$
152 PRINT@256,"":PRINT@288,"":PR
INT@320,"":PRINT@352,"":PRINT@38
4,"":PRINT@416,"":PRINT@448,""
155 B=0:C=0:J=0:MV=0:H$="":F$=""
159 IFA$="]"THENPRINT@160,"KARRA
K'S STRENGTH="INT(AG):GOTO150
160 IFA$="&"THENMV=1:GOTO143
161 IFA$="["THENB=7:GOTO900
162 IFA$="^"THENB=5:GOTO600
163 IFA$="_"THENB=1:C=9:GOTO300
164 IFAK(12)=52ANDP=115ANDA$="N"
THENN=1
165 IFA$="!"ORA$="="THENIFAE=0AN
DAF=0THENPRINT@288,"NOTHING TO F
IGHT HERE":GOTO150
166 IFA$="!"ANDC(1)=1THENB=2:H$=
C$(1):GOTO245
167 IFA$="="ANDC(4)=1THENB=11:H$
=C$(4):GOTO245
168 IFA$="!"ANDC(12)=1THENB=2:H$
=C$(12):GOTO245
169 IFA$="="ANDC(13)=1THENB=11:H
$=C$(13):GOTO245
170 IFLEN(A$)<1THEN150ELSEIFLEN(
```

```
A$)<2THENIFAE=0ANDAF=0THENMV=1:G
OTO950ELSE245
200 FORB=1TO20:FORX=1TOLEN(A$):D
$=B$(B):L=LEN(D$):IFMID$(A$,X,L)
=D$THENMID$(A$,X,L)="   ":GOTO22
0
210 NEXTX,B:B=0
215 PRINT@256,"I CAN'T DO THAT":
GOTO150
220 FORC=1TO20:FORY=1TOLEN(A$):D
$=C$(C):L=LEN(D$):IFMID$(A$,Y,L)
=D$THEN245
230 NEXTY,C:C=0
235 FORJ=1TO20:FORY=1TOLEN(A$):D
$=D$(J):L=LEN(D$):IFMID$(A$,Y,L)
=D$THEN245
240 NEXTY,J:J=0
245 IFAE=1THEN30110ELSEIFAF=1THE
N30510ELSEIFB=1ANDC=9THEN300
246 IFB=3THENPRINT@256,"WHERE":I
NPUTF$:IFF$=C$(9)THEN400ELSE975
247 IFB=4THEN500
248 IFB=5THEN600
249 IFB=6THEN700
250 IFB=7THEN900
251 IFB=11THENPRINT@256,"WITH WH
AT":INPUTH$:GOTO975
252 IFB=2THENPRINT@256,"WITH WHA
T":INPUTH$:GOTO975
```

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```
253 IFB=8ANDC=6ANDC(6)=1ANDC(7)=
0THENC(7)=3:PRINT@288,"A COIN FE
LL OUT":GOTO15000
254 IFB=12ANDC=10THENPRINT@288,"
WITH WHAT":INPUTLI$:IFLI$=C$(2)T
HENIFC(10)=10RC(10)=3THENIFC(2)=
1THENPRINT@448,"IT IS LIT":AK=1:
AL=0:MV=1:GOTO975
260 GOTO975
300 F=0:IFC(9)=1THEN310ELSEPRINT
@288,"I DON'T HAVE THE SACK":GOT
O150
310 PRINT@288,"I SEE IN THE SACK
:":FORX=1TO20:IFC(X)=2THENPRINT@
320+(F*8),C$(X):F=F+1
320 NEXTX:IFF=0THENPRINT@320,"NO
THING":GOTO150ELSEGOTO150
400 IFF$=C$(9)THEN410ELSE975
410 IFG>7THENPRINT@352,"THE SACK
 IS FULL":GOTO150
420 IFC(C)=1THENC(C)=2:G=G+1:H=H
-1:PRINT@288,"I PUT IT IN THE SA
CK":GOTO150
430 PRINT@288,"I DON'T HAVE THE
"C$(C):GOTO150
500 IFH>1THENPRINT@288,"MY HANDS
 ARE FULL":GOTO150
510 IFC(C)=2THENC(C)=1:H=H+1:G=G
-1:PRINT@288,"I HAVE THE "C$(C):
GOTO150
520 IFC(C)=3THENC(C)=1:H=H+1:PRI
NT@288,"I HAVE THE "C$(C):IFC=9T
HENH=H-1:GOTO15000ELSEGOTO15000
530 IFC(C)=1THENPRINT@288,"I ALR
EADY HAVE IT":GOTO150
540 PRINT@288,"I CAN'T GET IT":G
OTO150
600 F=0:PRINT@256,"I HAVE:":FORX
=1TO20:IFC(X)=1THENPRINT@288+(F*
8),C$(X):F=F+1
610 NEXTX:IFF=0THENPRINT@288,"NO
THING":GOTO150:ELSEGOTO150
700 IFC(C)<>1THENPRINT@288,"I DO
N'T HAVE IT":GOTO150
710 IFC=9THENH=H+1
720 H=H-1:C(C)=3:PRINT@288,"I DR
OPPED THE "C$(C):GOTO15000
900 MV=1:GOTO975
950 FORX=1TO20:IFC(X)=3THENC(X)=
P
951 NEXTX
952 FORX=1TO20:IFD(X)=3THEND(X)=
P
953 NEXTX
954 IFA$="N"ANDN=1THENVV=VV-1:GO
TO975
955 IFA$="S"ANDS=1THENVV=VV+1:GO
TO975
960 IFA$="W"ANDW=1THENHV=HV-5:GO
TO975
```

```
962 IFA$="E"ANDV=1THENHV=HV+5:GO
TO975
965 IFA$="U"ANDU=1THENLV=LV-100:
GOTO975
968 IFA$="D"ANDD=1THENLV=LV+100:
GOTO975
970 PRINT@288,"I CAN'T MOVE THAT
 WAY":FORX=1TO300:NEXT:GOTO150
975 P=VV+HV+LV:IFP<200THEN1000
976 IFP<300THEN3000
977 IFP<400THEN5000
6999 GOTO12990
12990 IFB=20RB=11THENPRINT@256,"
NO EFFECT":PRINT@288," ":GOTO150
12991 IFB=8ANDC=6THENPRINT@288,"
IT'S ALREADY OPEN":GOTO150
12992 IFB=1ANDC=8ANDC(8)=1THENPR
INT@288,"CROSS-SHAPED":GOTO150
12993 IFB=1ANDC=6ANDC(6)=1THENPR
INT@288,"SMALL,LEATHER":GOTO150
12994 IFB=1ANDC=1ANDC(1)=1THENPR
INT@288,"SOLID BRONZE,3 FEET LON
G":GOTO150
12995 IFB=1ANDC=4ANDC(4)=1THENPR
INT@288,"NINE INCHES LONG,DOUBLE
 SIDED   BLADE":GOTO150
12997 IFB=1THENPRINT@288,"I DON'
T SEE ANYTHING SPECIAL":GOTO150
12998 PRINT@448,"I'M UNABLE TO D
O THAT NOW":GOTO150
12999 GOTO12990
15000 P=LV+HV+VV:PRINT@72,"":PRI
NT@96,"":PRINT@128,"":PRINT@160,
""
15010 AG=AG+.45:IFAG>20THENAG=20
15050 F=0:FORX=1TO20:IFC(X)=3 OR
 C(X)=P THENPRINT@72+(F*8),C$(X)
:F=F+1:C(X)=3
15070 NEXTX
15080 FORX=1TO20:IFD(X)=3 OR D(X
)=P THENPRINT@72+(F*8),D$(X):F=F
+1
15085 NEXTX
15100 N=0:S=0:V=0:W=0:D=0:U=0
15110 IFO=0ANDT=0THENPRINT@38,"-
-NONE--":GOTO150
15120 IFT=1THENU=1
15125 IFT=2THEND=1
15130 IFT=3THENU=1:D=1
15135 IFO=1THENN=1
15140 IFO=2THENS=1
15145 IFO=3THENV=1
15150 IFO=4THENW=1
15155 IFO=5THENN=1:S=1
15160 IFO=6THENN=1:V=1
15165 IFO=7THENN=1:W=1
15170 IFO=8THENS=1:V=1
15175 IFO=9THENS=1:W=1
15180 IFO=10THENV=1:W=1
15185 IFO=11THENN=1:S=1:V=1
15190 IFO=12THENN=1:S=1:W=1
15195 IFO=13THENN=1:V=1:W=1
15200 IFO=14THENS=1:V=1:W=1
15205 IFO=15THENN=1:S=1:W=1:V=1
15207 PRINT@38,""
15208 IFO=16ANDT=0THENPRINT@38,"
none":GOTO150
15210 IFN=1THENPRINT@38,"N"
15215 IFS=1THENPRINT@40,"S"
15220 IFV=1THENPRINT@42,"E"
15225 IFW=1THENPRINT@44,"W"
15230 IFU=1THENPRINT@46,"U"
15235 IFD=1THENPRINT@48,"D"
15240 GOTO150
25000 CLS:INPUT"PUT BLANK TAPE I
N RECORDER-PRESSPLAY AND RECORD-
PRESS <ENTER>   WHEN READY";RE$
25010 FORY=1TO3:OPEN"O",#-1,"VAR
IABLE":FORX=1TO20:PRINT#-1,C(X):
NEXTX
25015 PRINT#-1,G,H,AG
25020 CLOSE#-1:NEXTY
25030 CLS:PRINT"THE VARIABLE TAP
E HAS BEEN SAVEDTHREE TIMES":PRI
NT"TO CONTINUE-CLOAD NEXT GAME A
ND FOLLOW THE DIRECTIONS":END
26000 CLS:INPUT"PUT TAPE WITH VA
RIABLES IN RE-  CORDER-PRESS PLA
Y/PRESS <ENTER> WHEN READY";RE$:
```


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OPEN"I",#-1,"VARIABLE"
26010 FORX=1TO20:INPUT#-1,C(X):N
EXT
26015 INPUT#-1,G,H,AG
26020 CLOSE#-1:FORX=1TO20
26025 IFC(X)<>1ANDC(X)<>2THENC(X
)=0
26030 NEXTX:GOTO110
```

Rainbow Check Plus

```
1105 .....027D | 139
3025 .....04B4 | 61
4007 ..... 06F0 | 27
4310 .... 0A9D | 210
5090 .... 0D7B | 21
6010 ..... 10FF | 161
12997 .... 1392 | 159
20089 .... 1638 | 234
30140 .... 194F | 199
END .....1C88 | 94
```

Listing 2

```
100 CLS(0):DIMB$(20),C$(20),C(20
),D$(20),D(20),A1$(25),A2$(25),A
3$(25),KA(12),AK(12)
110 CLS(0):D(17)=316:D(15)=316:D
(12)=323:D(11)=114:C(10)=114:AG=
20:AH=10:AI=10:D(8)=221:C(8)=221
:C(5)=2:C(6)=2:C(9)=1:H=1:C(1)=1
:C(2)=2:C(3)=2:C(4)=2:P=203:HV=0
:VV=3:LV=200
1000 IFMV=0THEN2000
1010 Q=P-LV:PRINT@9,A1$(Q)
1015 IFP=113THENO=1:T=2:D(4)=3:G
OTO15000
1020 IFP=112THENT=0:O=5:GOTO1500
0
1025 IFP=101THENO=8
1030 IFP=102THENO=5
1035 IFP=103THENO=5
1040 IFP=104THENO=5
1045 IFP=105THENO=6
1050 IFP=106THENO=10
1055 IFP=110THENO=10
1060 IFP=111THENO=14:GOTO15000
1065 IFP=114THENO=2:GOTO15000
1070 IFP=115THENO=13:GOTO15000
1075 IFP=116THENO=10
1080 IFP=120THENO=10
1085 IFP=121THENO=9
1090 IFP=122THENO=5
1095 IFP=123THENO=5
1100 IFP=124THENO=5
1105 IFP=125THENO=7
1999 GOTO30000
2000 IFB=1THEN2010ELSE2999
2010 IFJ=9THENIFD(9)=3ORD(9)=P T
HENPRINT@288,"DEAD":GOTO150
2020 IFJ=10THENIFD(10)=3ORD(10)=
P THENPRINT@288,"DEAD":GOTO150
2030 IFJ=11ANDP=114THENPRINT@288
,"LARGE,ORNATE,BRASS":GOTO150
2040 IFC=10THENIFC(10)=10RC(10)=
3THENPRINT@288,"UNLIT,18 INCHES
LONG":GOTO150
2999 GOTO12990
3000 IFMV=0THEN4000
3010 Q=P-LV:PRINT@9,A2$(Q)
3011 IFP=203THENO=3:T=0
3012 IFP=203ANDK=0THENPRINT@288,
"A SOLID,METAL DOOR SLAMMED DOWN
 AS I CAME IN-I CAN'T GO BACK":K
=1
3015 IFP=208ANDI=0THENPRINT@256,
"TO THE EAST IS A PIT,IN THE WAL
LIS A SLOT":D(1)=3:D(2)=3:O=4:T=
0
3020 IFP=208ANDI=1THENO=10:T=0:D
(2)=3
3025 IFP=209ANDM=0THENO=3:PRINT@
288,"CLOSED DOOR TO SOUTH":T=0:D
(6)=3
3030 IFP=209ANDM=1THENO=8:T=0
3035 IFP=210THENO=1:T=2:D(4)=3
3040 IFP=213THENO=9:T=1:D(4)=3
3045 IFP=214THENO=13:T=0
3050 IFP=216THENO=8:T=0
3055 IFP=217ANDR=0THENPRINT@288,
"BOLTS FROM EVERYWHERE HIT ME!":
FORX=1TO3000:NEXT:CLS:PRINT@264,
N$:END
3060 IFP=217THENO=5:T=0:D(5)=3
3065 IFP=218ANDR=0THEND(5)=3:PRI
NT@288,"IN THE WALLS TO THE NORT
H ARE   MANY SMALL HOLES":O=5:T=
0
3067 IFP=218ANDR=1THENO=5:T=0
3070 IFP=219THENO=7:T=0
3075 IFP=221THENO=4:T=0:PRINT@28
8,"THERE IS A TABLE IN THE CORNE
R":IFC(8)=221 ORC(8)=3THENPRINT@
320,"ON IT IS A KEY"
3999 GOTO15000
4000 '
4001 IFP=203ORP=208THENIFB=1ANDC
=7THENIFC(7)=1THENPRINT@288,"SMA
LL,SOLID GOLD":GOTO150
4005 IFP=208THEN4007ELSE4050
4007 IFB=1THEN4010ELSE4020
4010 IFJ=1THENPRINT@288,"DEEP,DA
RK":GOTO150
4015 IFJ=2THENPRINT@288,"1 INCH
WIDE,1/4 INCH HIGH":GOTO150
4020 IFB=3ANDF$=D$(2)ANDC=7ANDC(
7)=1THENPRINT@256,"'CLINK'":PRIN
T@288," ":FORX=1TO2000:NEXT:PRIN
T@288,"A BRIDGE SLID FROM THE FA
R PIT  WALL":C(7)=4:O=10:I=1:H=H
-1:D(3)=3:GOTO15000
4050 IFP=218THEN4055ELSE4100
```

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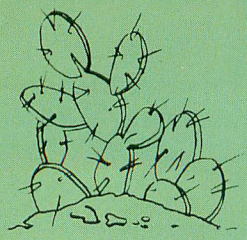

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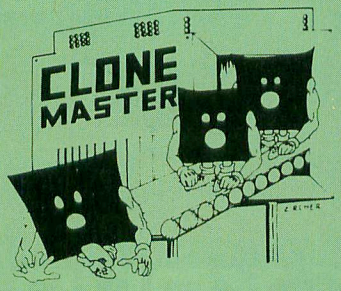

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This is the ultimate disk backup utility, and who else but Prickly-Pear, originators of Omni-Clone, could bring it to you. If you are tired of waiting for your BACKUP command to finish, you'll like the speed of CLONE MASTER. This program checks the computer memory size, and if you have a 64K machine it will do a backup on a full disk in about 7 minutes — including formatting the destination disk — with only THREE swaps, not the seven you are used to, and if you are running multiple drives, CLONE MASTER will handle up to 4 double-sided drives. In addition, although we can't guarantee that CLONE MASTER will back up any disk, it can handle backups of any non-standard (protected) disk we have seen — not only on the Color Computer, but on Model III and IV, IBM PC, Kaypro, Osborne, and Atari. It handles up to 256 tracks, single and double density — even on the same track, CRC errors, and lots more. It even checks the speed of your drives for you! If you are using a disk drive, you know how disks will crash, so don't leave your valuable software unprotected any longer. Back it up or lose it! CLONE MASTER will adjust to any memory size and works with any version of the ROM's — including the JVC controller. **$39.95**

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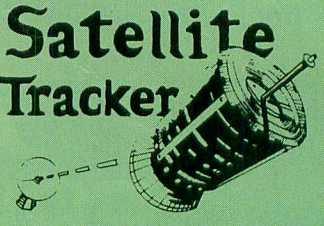
The most complex simulation we have ever seen, and you VIKING! fans will want to take note. This game has you running a small holding in old Ireland. You must manage your land, sheep, army, markets, fishing fleets, taxes, and many other factors while you try to rise in rank to become King or Queen. You may attack — or be attacked — by the other players, and you will have to face the fact that there isn't enough land to go around, and you may have to take some away from someone else! This 32K game is considerably more complex and difficult than our super popular VIKING! Because of this, we have added a save-the-game feature. ERLAND is for 2 to 5 game lovers, and will warm the heart of anyone who liked VIKING!, Monopoly, or other classic strategy games. This game is a hybrid of Extended Basic and Machine language. The disk and tape versions are not interchangable. **Tape — $24.95; Disk — $29.95**



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If you are interested in reception of transmissions from the television satellites, you will need this program. It does all calculations associated with planning and setting up a satellite dish antenna. It figures antenna gain, signal to noise, aiming point for any geosyncronous satellite, effect of various quality amplifiers, and a lot more. The program will tell you whether a dish is practical in your location, how big it needs to be, and what kind of picture quality and signal strength you will achieve. If you are thinking of investing in a system, don't make a move until the results are in. Requires 32K extended BASIC and some (limited) knowledge of satellite terms and language. **$79.95**

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```
4055 IFB=1THEN4060ELSE4075
4060 IFJ=5ANDR=0THENPRINT@288,"S
HARP POINT IN EACH":GOTO150
4065 IFJ=5ANDR=1THENPRINT@288,"A
LL ARE EMPTY":GOTO150
4075 IFB=9ANDC=9THENPRINT@320,"W
HICH DIRECTION(N S E W U D)":INP
UTO$:IFO$="N"THENPRINT@352,"BOLT
S FLEW OUT OF THE HOLES AND HARM
LESSLY HIT THE WALLS":R=1:C(9)=2
17:GOTO150:ELSEC(9)=3:GOTO15000
4100 IFP=209THEN4110ELSE4300
4110 IFB=1ANDJ=6THENPRINT@288,"H
EAVY WOOD,BLACK METAL LOCK":D(7)
=3:GOTO15000
4120 IFB=8ANDJ=6ANDAA=0THENPRINT
@288,"WON'T OPEN":GOTO150
4130 IFB=8ANDJ=6THENPRINT@288,"I
T SWUNG INWARD":M=1:O=8:GOTO1500
0
4140 IFB=10ANDJ=7THENPRINT@288,"
WITH WHAT":INPUTP$:IFP$="KEY"AND
C(8)=1THENPRINT@288,"IT IS UNLOC
KED":AA=1:GOTO150
4150 IFB=1ANDJ=7THENPRINT@288,"C
ROSS SHAPED OPENING":GOTO150
4300 IFP=221THEN4310ELSE4999
4310 IFB=1ANDJ=8THENPRINT@288,"A
 SMALL,THREE LEGGED TABLE WITH A
 DRAWER":D(18)=3:GOTO15000
4320 IFB=1ANDJ=18ANDD(18)<>0ANDA
N=1THEN4325ELSE4340
4325 IFC(11)=0ORC(11)=3THENPRINT
@288,"A JADE PENDANT":C(11)=3:GO
TO15000
4330 PRINT@288,"EMPTY":GOTO150
4340 IFB=8ANDJ=18THENPRINT@288,"
IT IS OPEN":AN=1:GOTO150
4345 IFB=1ANDC=11ANDC(11)=1THENP
RINT@288,"TURTLE":GOTO150
4999 GOTO12990
5000 IFMV=0THEN6000
5010 IFC(10)=10RC(10)=3THENIFAK=
1THENQ=P-LV:PRINT@9,A3$(Q):AL=0:
GOTO5020
5015 PRINT@9,"too dark to see":A
L=1
5020 IFP=310ANDAL=1THENO=16:T=1:
GOTO15000
5030 IFP=310THENO=3:T=1:D(4)=3
5040 IFAL=1THENPRINT@288,"SOMETH
ING HEAVY SPRANG OUT AT MEAND KN
OCKED ME TO THE FLOOR":FORX=1TO1
500:NEXT:PRINT@352,"I CANNOT FIG
HT IT OFF-IT IS RIP-PING ME APAR
T!":FORX=1TO3500:NEXT:CLS:PRINT@
263,N$:END
5050 IFP=315THENO=10:T=0:D(14)=0
5060 IFP=320THENO=7
5070 IFP=324THENO=7
5080 IFP=319THENO=8
5090 IFP=323THENO=2:PRINT@288,"A
 BUBBLING POOL OF MOLTEN SULFURB
LOCKS MY WAY-THERE IS A PASSAGET
O THE NORTH BEYOND"
5100 IFAM=0ANDP=322THENO=4:D(14)
=4:PRINT@288,"THE LIZARD SUNK FR
OM SIGHT":D(12)=3
5110 IFP=322THENO=4:D(12)=3
5115 IFP=317THENO=6
5120 IFP=316THENO=8:PRINT@288,"T
HERE IS A PATH TO THE EAST AND A
 LEDGE HIGH UP ON THE WEST WALL"
5125 IFP=321THENPRINT@288,"I HEA
R A SCREECHING SOUND FROM  OVERH
EAD!!??":FORX=1TO2500:NEXT:PRINT
@352,"A HUGE HARPY HAS ME IN IT'
S GRIP":FORX=1TO2500:NEXT:PRINT@
384,"IT'S LIFTING ME UP!":FORX=1
TO2000:NEXT:PRINT@416,"IT DROPPE
D ME!":FORX=1TO2000:NEXT
5130 IFP=321THENPRINT@448,"THUD!
!":FORX=1TO1000:NEXT:PRINT@9,"LE
DGE":PRINT@38,"none":PRINT@69,""
:PRINT@96," ":PRINT@128," ":PRIN
T@288,"THIS IS THE END OF PART 1
       WAIT A MOMENT PLEASE":PRI
NT@352," ":PRINT@384," ":PRINT@4
16," "
5135 IFP=321THENPRINT@448," ":FO
RX=1TO5000:NEXT:GOTO25000
5999 GOTO15000
6000 IFB=1ANDJ=13ANDP=323THENIFD
(13)=3ORD(13)=323THENPRINT@288,"
THEY ARE FINNED":IFD(14)=0THENFO
RX=1TO2000:NEXT:PRINT@320,"A LAR
GE LIZARD IS COMING OUT OF THE P
OOL!":D(14)=3:GOTO15000ELSE150
6010 IFB=1ANDJ=12ANDP=323THENPRI
NT@288,"ABOUT 15 FEET ACROSS,THE
RE ARE  TRACKS COMING FROM AND G
OING TO IT":D(13)=3:GOTO15000
6020 IFB=1ANDJ=14ANDP=323ANDD(14
)<>0THENPRINT@288,"YELLOW,ABOUT
20 FEET IN LENGTH":GOTO150
6030 IFP=323THENIFB=20RB=11THENI
FD(14)<>0THENPRINT@288,"THE LIZA
RD RETURNED TO THE POOL":D(14)=4
:GOTO15000
6040 IFP=323ANDB=13ANDJ=14THENPR
INT@288,"WHAT":INPUTFO$:IFFO$=C$
(5)ANDC(5)=1THENPRINT@320,"THE L
IZARD ATE AND WENT TO THE  POOL-
IT IS SPANNING THE POOL    WITH
IT'S BODY":O=5:H=H-1:C(5)=0:GOTO
15000
12990 REM
12991 IFB=8ANDC=6THENPRINT@288,"
IT'S ALREADY OPEN":GOTO150
12992 IFB=1ANDC=8ANDC(8)=1THENPR
```

```
INT@288,"CROSS-SHAPED":GOTO150
12993 IFB=1ANDC=6ANDC(6)=1THENPR
INT@288,"SMALL,LEATHER":GOTO150
12994 IFB=1ANDC=1ANDC(1)=1THENPR
INT@288,"SOLID BRONZE,3 FEET LON
G":GOTO150
12995 IFB=1ANDC=4ANDC(4)=1THENPR
INT@288,"NINE INCHES LONG,DOUBLE
 SIDED   BLADE":GOTO150
12997 IFB=1THENPRINT@288,"I DON'
T SEE ANYTHING SPECIAL":GOTO150
12998 PRINT@448,"I CAN'T":GOTO15
0
12999 GOTO12990
20000 DATA LOOK,HIT,PUT,GET,LIST
,DROP,VIEW,OPEN,THROW,UNLOCK,STA
B,LIGHT,FEED,ZZ,ZZ,ZZ,ZZ,ZZ,ZZ,Z
Z
20020 DATA SWORD,FLINT,ROPE,DAGG
ER,JERKY,POUCH,COIN,KEY,SACK,TOR
CH,PENDANT,12,13,14,15,16,17,18,
19,20
20040 DATA PIT,SLOT,BRIDGE,STAIR
S,HOLES,DOOR,LOCK,TABLE,DRAGON,B
OAR,THRONE,POOL,TRACKS,LIZARD,LE
DGE,HARPY,PATH,DRAWER,ZZ,ZZ
20049 REM A2$( )
20050 DATA 201,202,HALL,204,205,
206,207,HALL,HALL,LARGE ROOM
```


UPLOAD $16.95

This is the UPLOAD side of DLOAD and DLOADM in Extended Color Basic. Send a basic or machine program to another ECB Color Computer. Programs can be passed directly or by phone if both computers are hooked to modems.(not supplied). Uploaded program arrives at the receiving end ready to save, run, or execute. Patch to correct the flaw in DLOADM is supplied in public domain.

INDEXER $14.95

Program produces a sorted list of variables and line numbers used in your basic program. Following each variable or line number will be a listing of the numbers of the basic lines which contain the variable or line number. RUNning the basic program is not required. Bonus! Global search of basic program for a variable, a text string, or a basic keyword.

Fast machine language
16K/32K EXTENDED BASIC, Tape or RS Disk
Add $2.00 for shipping and handling

RAINBOW CERTIFICATION SEAL

ML-US'R SOFTWARE
115 RISING SUN, Dept R
FORT MITCHELL, KY 41017

RAINBOW CERTIFICATION SEAL


```
20055 DATA 211,212,LOBBY,HALL,21
5,HALL,HALL,HALL,HALL,220
20060 DATA SMALL CUBICLE,222,223
,224,225
20069 REM A1$( )
20070 DATA HALL,HALL,HALL,HALL,H
ALL,HALL,107,108,109,HALL
20075 DATA HALL,HALL,LANDING,THR
ONE ROOM,HALL,HALL,117,118,119,H
ALL
20080 DATA HALL,HALL,HALL,HALL,H
ALL
20089 REM A3$( )
20090 DATA 301,302,303,304,305,F
ISSURE,307,308,309,ROCK TUNNEL
20095 DATA LEDGE,312,313,314,TUN
NEL,VAST CAVERN,TUNNEL,318,TUNNE
L,TUNNEL
20100 DATA ???,CAVERN,CAVERN,TUN
NEL,325
20120 DATA 1514,11,1515,1,1516,1
8,1517,18,1518,1,1519,11,1520,45
,1521,16,1522,1,1523,18,1524,20,
1525,49
30000 IFAB=1ANDAC=1THENAE=0:AF=0
:GOTO15000
30010 X=RND(-TIMER)
30015 X=RND(100):IFX>40THEN15000
30020 X=RND(200):IFX>100THEN3050
0
30100 IFAC=1ANDC(10)=114THEN1500
0
30103 IFAB=1THEN15000
30105 AJ=0
30110 O=16:T=0:PRINT@384,"AN EME
RALD-GREEN DRAGON IS NOW  ATTACK
ING":AE=1:D(9)=3
30115 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRACK'S STRENGTH=":PRINT@308,AI:
PRINT@340,AG
30120 IFB=2ANDH$=C$(1)THENX=RND(
100):IFX>40THENPRINT@448,"A SOLI
D HIT!":AH=AH-5:ELSEPRINT@448,"M
ISSED-THE DRAGON DIDN'T":AG=AG-4
30140 IFB=11ANDH$=C$(4)THENX=RND
(100):IFX>40THENPRINT@448,"JUST
CAUGHT IT!":AH=AH-2:ELSEPRINT@44
8,"DRAGON SWIPED MY CHEST!":AG=A
G-2
30160 IFB<>2ANDB<>11THENPRINT@25
6,"THE DRAGON'S TAIL HIT ME!":AG
=AG-2
30200 PRINT@308,AH:PRINT@340,AG
30300 IFAH<1THENPRINT@256,"THE D
RAGON IS DEAD":PRINT@384," ":PRI
NT@416," ":O=AJ:AB=1:AE=0:GOTO15
000
30400 IFAG<1THENPRINT@256,N$:FOR
X=1TO2000:NEXT:CLS:END
```

```
30499 GOTO15000
30500 IFAB=1ANDC(10)=114THEN1500
0
30505 IFAC=1THEN15000
30507 AJ=0
30510 O=16:T=0:PRINT@384,"A WILD
 BOAR IS NOW ATTACKING":D(10)=3:
AF=1
30515 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRAK'S STRENGTH=":PRINT@308,AH:P
RINT@340,AG
30520 IFC(1)=1THENIFB=2THENX=RND
(100):IFX>40THENPRINT@448,"A SOL
ID BLOW!":AI=AI-5:ELSEPRINT@448,
"A TUSK CAUGHT MY LEG":AG=AG-3
30530 IFC(4)=1THENIFB=11THENX=RN
D(100):IFX>30THENPRINT@448,"A SL
IGHT WOUND IN IT'S NECK":AI=AI-2
:ELSEPRINT@448,"IT'S HOOF RIPPED
 MY LEG":AG=AG-2
30535 PRINT@308,AI:PRINT@340,AG
30540 IFB<>2ANDB<>11THENPRINT@44
8,"IT'S TEETH CUT MY ANKLE":AG=A
G-2
30550 IFAI<1THENPRINT@256,"THE B
OAR IS DEAD":PRINT@384," ":AC=1:
O=AJ:AF=0:GOTO15000
30560 IFAG<1THENPRINT@288,H$:FOR
X=1TO2000:NEXT:CLS:END
30999 GOTO15000
```

Rainbow Check Plus

1040.....033D	0
1100..... 0692	191
2100.... 08BD	50
3090.... 0BFE	111
5170..... 0F58	251
6030.....119B	12
20020....14B4	53
30110.... 1813	69
30300....1B90	60
END.....1E52	203

Listing 3

```
100 CLS(0):DIMB$(20),C$(20),C(20
),D$(20),D(20),A1$(25),A2$(25),A
3$(25),KA(12),AK(12)
110 CLS(0):C(7)=301:AH=15:AI=10:
C(7)=301:C(5)=124:D(1)=123:P=123
:HV=20:VV=3:LV=100
1000 IFMV=0THEN2000
1001 Q=P-LV:PRINT@9,A1$(Q)
1010 IFP=123THENIFC(10)=30RC(10)
=P THENO=4:D(1)=3:PRINT@288,"THE
RE IS A FISSURE IN THE ROCK  TO
THE WEST-JUST WIDE ENOUGH TO ENT
ER. THE TORCH WENT OUT-BUT ITIS
LIGHT ENOUGH TO SEE WITHOUT  IT"
:GOTO15000
1013 IFP=123THENO=4:D(1)=3
1015 IFP=118THENO=6:PRINT@288,"V
ERY NARROW HERE"
1020 IFP=117THENO=8
1025 IFP=122THENO=7:PRINT@288,"B
ARELY ENOUGH ROOM TO MOVE"
1030 IFP=121THENO=9:IFBA=0THENPR
INT@288,"A LITTLE WIDER HERE":BA
=1
1035 IFP=116THENO=10:T=0:D(2)=3:
D(1)=3:D(3)=3:IFBC=0THENPRINT@28
8,"I'M AT THE BEGINNING OF A PAT
H- IT WINDS HIGH ALONG THE WALL
OF ANOTHER VAST CAVERN- ALONG TH
E  FLOOR TO THE SOUTH RUNS A RED
-  COLORED RIVER":BC=1
1040 IFP=111THENO=10:T=2:D(3)=3:
D(4)=3:PRINT@288,"STEPS LEAD DOW
N"
1045 IFP=106THENO=10:T=0:D(3)=3
1050 IFP=101THENO=8:D(3)=3
1055 IFP=102THENO=5:T=0:D(3)=3
1060 IFP=103THENO=5:T=2:D(3)=3:D
(4)=3:PRINT@288,"STEPS LEAD DOWN
. TO THE EAST IS THE RIVER IN TH
E CAVERN FLOOR"
1065 IFP=104THENO=5:D(3)=3:T=0:D
(7)=3:PRINT@288,"TO THE EAST I S
EE WHAT LOOKS TO BE A TEMPLE.IT
IS IN A CLEFT OF ROCK IN THE CAV
ERN WALL"
1070 IFP=105THENO=6:D(3)=3:PRINT
@288,"TO THE EAST IS A SHAFT- TO
 THE  NORTHEAST IS THE RIVER IN
THE  CAVERN FLOOR":D(5)=3
1075 IFP=110THENO=10:PRINT@288,"
TO THE WEST IS A PATH":D(2)=3
1080 IFP=115THENO=10
1085 IFP=120THENO=7:T=0
1090 IFP=119ANDBD=0THEND(5)=3:O=
2:T=2:PRINT@288,"THE SHAFT SLANT
S DOWNWARD.IN THEEAST WALL IS A
DOOR":D(6)=3:GOTO15000
1095 IFP=119THENO=8:D(5)=3:T=2:P
RINT@288,"THE SHAFT SLANTS DOWNW
ARD.TO THEEAST IS AN OPEN DOOR":
D(6)=3
1100 IFP=124THENO=4:T=0:IFC(5)=3
ORC(5)=P THENPRINT@288,"AN IDOL
RESTS IN A NICHE IN THE SOUTH WA
LL":C(5)=3:D(8)=3:ELSEPRINT@288,
"THE NICHE IS EMPTY":D(8)=3:GOTO
15000
1999 GOTO15000
2000 REM
2010 IFB=1THEN2020ELSE2200
2020 IFD(J)=30RD(J)=P THEN2030EL
SE2200
2030 IFJ=1THENPRINT@288,"TALL,NA
RROW":GOTO150
2035 IFJ=8THENPRINT@288,"CARVED
OUT OF THE WALL":GOTO150
```

A Dictionary Program is Useless Unless It's Perfect. That's Why We Are Introducing

SPELL 'N FIX II

A Spelling Dictionary Program is supposed to help you catch and fix mistakes in word processing text. It should be simple and convenient to use. It should be fast. And above all, it must be accurate.

SPELL 'N FIX is all of these. But now SPELL 'N FIX II is even better! Look at the comparison chart to see why.

SPELL 'N FIX II finds and fixes spelling and typing errors in a single pass. As SPELL 'N FIX II proofreads your text, you see it all (in full upper and lower case) right on the screen. When a suspect word is found, you see it in context as part of the text. You can immediately search the SPELL 'N FIX II dictionary for the correct spelling, and put the right word into your text in a flash.

Most important of all, we take great pains to make sure that SPELL 'N FIX is accurate and complete. SPELL 'N FIX II comes with a 20,000+ word standard dictionary which contains many more words than the average person uses. By allowing you to add your own words, SPELL 'N FIX II gives you the advantage of a short, fast dictionary that can contain all the words you use (including your name and address, special words from your business, and even foreign or coined words.) We don't stuff our dictionary with useless words (some with foreign spellings or downright wrong like absorbancy, accidently, accts, agcy, aix, or analyse as you find in other programs' 60,000 word dictionaries.)

COMPARISON CHART

	Radio Shack Color Dictionary 26-3265	Original SPELL 'N FIX	New SPELL 'N FIX II
Checks SCRIPSIT (R) files	YES	YES	YES
Checks other text processor files	NO	YES	YES
Checks Basic data files	NO	YES	YES
Checks files larger than memory	NO	YES	YES
Full upper and lower case display	NO	NO	YES
Add words to dictionary	NO	YES	YES
Delete words from dictionary	NO	YES	YES
Custom dictionaries possible	NO	YES	YES
Comes with error-free dictionary	NO	YES	YES
Usable for foreign languages	NO	YES	YES
Checks and fixes in one pass	NO	NO	YES
Shows suspect words in context	YES	YES	YES
Usable with just one diskette	NO	YES	YES
Looks up words in dictionary	YES	NO	YES
Looks up words while correcting	NO	NO	YES
DIR command allowed during run	NO	YES	YES
Uses standard Basic file format	NO	YES	YES
Price	$59.95	$49.39	$69.29

(Note: SCRIPSIT is a trademark of Tandy Corporation)

Regardless of which you choose — the original SPELL 'N FIX (available on tape or disk, for 16K or larger computers, now at a new low price with generous upgrade terms), or the new SPELL 'N FIX II — you will understand why we say

A Dictionary Program is Useless Unless It's perfect.
SPELL 'N FIX Perfect!

STAR — KITS

P.O. BOX 209 — R
MT. KISCO, N.Y. 10549
(914) 241-0287

STAR — KIBBITS

It seems like just yesterday that I wrote the first Star — Kibbits column (though it wasn't called that then — I called it "A Word From the Sponsor"). But here it is — a whole year later. Time does fly!

?IO ERROR

Familiar message on your disk system? Perhaps the problem is noise. Let me explain.

A few weeks ago, I was asked by a local businessman to check out one of his four CoCos. I went to his office, and found that one of his Radio Shack drives was making a lot of errors.

We disconnected the drive and went to a local Radio Shack service center. Imagine my surprise (and embarrassment) when the drive worked perfectly on their test bench. Back to the office and more IO errors.

After some headscratching (not much hair to get in the way), I decided that Radio Shack drives must be very sensitive to external magnetic fields, and that this drive was picking up noise from the motor of a blower he had installed to keep his CoCo cool. We placed the drive to the right of the computer, on a small dish rack from the local 5-and-10, and his problems went away.

When you think about it, the read-write head in a disk drive works on very low level magnetic fields, and can easily pick up noise from nearby electric motors or transformers. The MPI drives I am using on my own system have a small copper shield near the head; the drives don't work very well at all if you accidentally leave it out. Some drive manufacturers even tell you not to mount two drives next to each other, since they will pick up noise from each other's motors.

Though this particular drive seemed more sensitive than most, still it's not surprising that where you put the drive can make a big difference. If you are having problems with IO errors, try moving the drive far away from everything else. It might help.

DOUBLE — SIDED DISKS

We are selling a complete disk system with a disk controller, a double-sided 40-track drive, cabinet, power supply and all cables, all for $400. The advantage, of course, is that the double-sided drive gives you the capacity of two regular drives for just slightly more than only one.

If you currently have a double-sided drive, send us a large self-addressed stamped envelope and we will send you free details on how to use it with your CoCo.

That's it for this month — see you next time.

SPELL 'N FIX II

Regardless of whose text processor you use, "let SPELL 'N FIX II" find and fix your spelling and typing mistakes. It reads text faster than you can, and spots and corrects errors even experienced proofreaders miss. It is compatible with all Color Computer text processors. $69.29 in the Radio Shack disk or cassette versions; $178.58 in the Flex version. Older SPELL 'N FIX I is now priced at just $49.95 Both include a 20,000 word dictionary.

HUMBUG — THE SUPER MONITOR

A complete monitor and debugging system which lets you input programs and data into memory, list memory contents, insert multiple breakpoints, single-step, test, checksum, and compare memory contents, find data in memory, start and stop programs, upload and download, save to tape, connect the Color Computer to a terminal, printer, or remote computer, and more. HUMBUG on disk or cassette costs just $39.95, special 64K version for FLEX or STAR-DOS 64 costs $59.95, MC-10 version $29.95.

STAR—DOS

A Disk Operating System specially designed for the Color Computer, STAR-DOS is fully compatible with your present Color Computer disk format — it reads disks written by Extended Disk Basic and vice versa. STAR-DOS for 16K or 32K systems costs $49.90; STAR-DOS 64 for 64K systems costs $74.90.

ALL IN ONE — Editor Etc.

Three programs in one — a full function Editor, a Text Processor and a Mailing List/Label program. All this for just $50. Requires STAR-DOS or FLEX, specify which.

DBLS for Data Bases

DBLS stands for Data Base Lookup System. A super-fast system for searching for a selected record in a sequential disk file. Supplied with SPELL 'N FIX's 20,000 word dictionary as a sample data file — lets you look up the spelling of any word in under FOUR seconds. Priced at $29.95. Requires STAR-DOS.

CHECK 'N TAX

Home accounting package combines checkbook maintenance and income tax data collection. Written in Basic for either RS Disk or Flex, $50.

REMOTERM

REMOTERM — makes your CoCo into a host computer, operated from a remote terminal. $19.95, disk or cassette.

NEWTALK

NEWTALK — a memory examine utility for machine language programmers which reads out memory contents through the TV set speaker. $20, disk or casette.

SHRINK

SHRINK — our version of Eliza, in machine language and extremely fast. $15, disk or casette.

EDUCATIONAL SOFTWARE

Introduction to Numerical Methods — college level course on computer math, $75.00, disk or casette.

We accept cash, check, COD, Visa, or Master Card. NY State residents please add appropriate sales tax. Add $3 to above price for AMDEK 3" disk versions.

(FLEX is a trademark of Technical Systems Consultants, Inc. Everything else in this ad is a trademark of Star-Kits.)

STAR-KITS

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(914) 241-0287

```
2040 IFJ=2THENPRINT@288,"ROUGH R
OCK,NARROW":GOTO150
2050 IFJ=3THENPRINT@288,"DEEP-RE
D COLOR,FUMES RISING FROMIT'S SU
RFACE":GOTO150
2060 IFJ=4THENPRINT@288,"CHISELL
ED FROM THE CAVERN WALL, STEEP":
GOTO150
2070 IFJ=5THENPRINT@288,"MAN OR
CREATURE-MADE.A STRANGE  GLOW EM
ANATES FROM IT'S SURFACE":GOTO15
0
2080 IFJ=6THENPRINT@288,"BRONZE,
MASSIVE,A TURTLE CAST IN RELIEF
AT THE CENTER":GOTO150
2090 IFJ=7THENPRINT@288,"MUCH TO
O FAR AWAY TO SEE ANY DE-TAIL":G
OTO150
2100 GOTO12990
2200 IFP=119ANDBD=0ANDB=8ANDJ=6T
HENPRINT@288,"'CREAK'":FORX=1TO1
000:NEXT:PRINT@320,"THE DOOR IS
OPEN-":BD=1:O=8:T=2:GOTO15000
2210 IFB=1ANDC=5ANDC(5)=1THENPRI
NT@288,"A JADE TURTLE":GOTO150
2999 GOTO12990
3000 IFMV=0THEN4000
3001 Q=P-LV:PRINT@9,A2$(Q)
3005 GOTO3025
3008 X=RND(100):IFX<70THEN3010EL
SE15000
3010 PRINT@384,"AN ARROW CAME FR
OM":X=RND(2):IFX=1THENPRINT@403,
"ABOVE":ELSEPRINT@403,"BELOW"
3011 X=RND(3):IFX=1THENPRINT@416
,"IT MISSED ME":ELSEIFX=2THENPRI
NT@416,"IT HIT MY ARM":AG=AG-5:E
LSEPRINT@416,"IT HIT MY LEG":AG=
AG-73014 IFAG<1THENPRINT@448,"KA
RRAK IS DEAD":FORX=1TO3000:NEXT:
CLS:END
3015 GOTO15000
3025 IFP=211ORP=203THENPRINT@288
,"I'M IN THE MIDDLE OF THE STEPS
":T=3:O=16:D(3)=3:GOTO3008
3040 IFP=219ANDBE=1THENPRINT@288
,"THE STONE IS BLOCKING THE WAY
UP":O=16:T=2:D(9)=3:GOTO15000
3050 IFP=219THENX=RND(100):IFX>2
0THEN3090
3060 T=2:O=16:PRINT@288,"'THUD'"
:FORX=1TO2000:NEXT:PRINT@320,"A
LARGE STONE FELL-BLOCKING THE WA
Y BACK UP":BE=1:D(9)=3:GOTO15000
3090 T=3:O=16:PRINT@288,"THE SHA
FT RUNS UP AND DOWN"
3999 GOTO15000
4000 REM
4999 GOTO12990
5000 IFMV=0THEN6000
5001 Q=P-LV:PRINT@9,A3$(Q)
5010 IFP=302THENIFBG=0THENAF=1:O
=11:T=0:GOTO30500
5015 IFP=306THENIFBG=0THENAF=1:O
=9:T=0:GOTO30500
5025 IFP=323THENIFBF=0THENAE=1:D
(11)=3:B=11:C=0:J=0:H$=C$(4):O=5
:AJ=0:GOTO160
5030 IFP=301THENO=8
5040 IFP=302THENO=11:T=0
5050 IFP=303THENO=1:T=1:D(4)=3
5060 IFP=306THENO=9
5070 IFP=307THENO=12
5080 IFP=308THENO=6:D(3)=3
5090 IFP=311THENO=2:T=1:D(4)=3
5100 IFP=312THENO=11:T=0:D(3)=3:
D(7)=3
5110 IFP=313THENO=7:D(3)=3
5120 IFP=319THENO=2:T=1:D(5)=3:P
RINT@288,"THE SHAFT SLOPES UPWAR
D"
5130 IFP=320THENO=6:T=0
5140 IFP=316THENO=8:D(7)=3:D(3)=
3:PRINT@288,"THE RIVER IS TO THE
 EAST-ON THE OTHER SIDE IS THE T
EMPLE"
5150 IFP=317THENO=7:D(7)=3:D(3)=
3
5160 IFP=321THENO=4:D(7)=3:D(3)=
3:PRINT@288,"THE RIVER IS TO THE
 SOUTH,THE   CAVERN WALLS TO THE
 NORTH AND   EAST"
5170 IFP=322THENPRINT@9,"TEMPLE"
:PRINT@38,"NONE":PRINT@288,"THIS
 IS THE END OF PART 2        WAIT
 A MOMENT PLEASE":PRINT@69," ":P
RINT@96," ":PRINT@128," ":FORX=1
TO5000:NEXT:GOTO25000
5180 IFP=323THENO=5:D(4)=3
5190 IFP=324ANDBF=0THENO=5:D(4)=
3:D(11)=3:PRINT@288,"THERE IS A
GOBLIN STANDING GUARDON THE TEMP
LE STEPS TO THE NORTH":GOTO15000
5195 IFP=324THENO=5:D(4)=3:D(11)
=3:IFC(12)=0THENC(12)=3
5196 IFP=324THEND(7)=3:IFC(13)=0
THENC(13)=3
5200 IFP=325THENO=7
5999 GOTO15000
6000 REM
6005 IFB=1THENIFD(J)=3ORD(J)=P T
HEN6010ELSE6050
6010 IFJ=3THENPRINT@288,"BOILING
 LAVA":GOTO150
6015 IFJ=4THENPRINT@288,"ROUGH,H
AND-HEWN":GOTO150
6020 IFJ=7THENPRINT@288,"STONE B
LOCKS,A TURTLE CARVED    OVER TH
E ENTRANCE":GOTO150
6025 IFJ=11THENIFBF=1THENPRINT@2
```

```
88,"DEAD":GOTO150:ELSEPRINT@288,
"FIERCE LOOKING,LEATHER ARMOR,
 ARMED WITH A MACE AND HAND AX":
GOTO150
6030 IFJ=12THENPRINT@288,"DEAD":
GOTO150
6050 IFB=1ANDC=7ANDC(7)=1THENPRI
NT@288,"SOLID GOLD,EMBOSSED WITH
 MANY   SMALL TURTLES":GOTO150
6060 IFB=1ANDC=12ANDC(12)=1THENP
RINT@288,"TWO FEET LONG,LARGE BR
ASS HEAD  WITH SHARP SPIKES":GOT
O150
6070 IFB=1ANDC=13ANDC(13)=1THENP
RINT@288,"ONE FOOT LONG,STONE HE
AD":GOTO150
12990 REM
12991 IFB=8ANDC=6THENPRINT@288,"
IT'S ALREADY OPEN":GOTO150
12992 IFB=1ANDC=8ANDC(8)=1THENPR
INT@288,"CROSS-SHAPED":GOTO150
12993 IFB=1ANDC=6ANDC(6)=1THENPR
INT@288,"SMALL,LEATHER":GOTO150
12994 IFB=1ANDC=1ANDC(1)=1THENPR
INT@288,"SOLID BRONZE,3 FEET LON
G":GOTO150
12995 IFB=1ANDC=4ANDC(4)=1THENPR
INT@288,"NINE INCHES LONG,DOUBLE
 SIDED   BLADE":GOTO150
12997 IFB=1THENPRINT@288,"I DON'
T SEE ANYTHING SPECIAL":GOTO150
12998 PRINT@448,"I CAN'T":GOTO15
0
12999 GOTO12990
20000 DATA LOOK,HIT,PUT,GET,LIST
,DROP,VIEW,OPEN,THROW,UNLOCK,STA
B,LIGHT,FEED,ZZ,ZZ,ZZ,ZZ,ZZ,ZZ,Z
Z
20020 DATA SWORD,FLINT,ROPE,DAGG
ER,IDOL,POUCH,CHALICE,KEY,SACK,T
ORCH,PENDANT,MACE,HAND AX,14,15,
16,17,18,19,20
20040 DATA FISSURE,PATH,RIVER,ST
EPS,SHAFT,DOOR,TEMPLE,NICHE,STON
E,ZZ,GOBLIN,WOLF,ZZ,ZZ,ZZ,ZZ,ZZ,
ZZ,ZZ,ZZ
20049 REM A2$( )
20050 DATA 201,202,STEPS,204,205
,206,207,208,209,210
20055 DATA STEPS,212,213,214,215
,216,217,218,SHAFT,220
20060 DATA 221,222,223,224,225
20069 REM A1$( )
20070 DATA PATH,PATH,PATH,PATH,P
ATH,PATH,107,108,109,SHAFT
20075 DATA PATH,112,113,114,SHAF
T,PATH,FISSURE,FISSURE,SHAFT,SHA
FT
```


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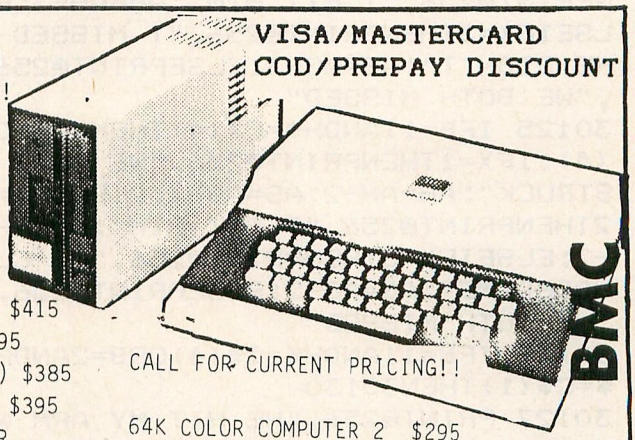

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```
20080 DATA FISSURE,FISSURE,LEDGE
,VAULT,125
20089 REM A3$( )
20090 DATA CAVERN FLOOR,CAVERN F
LOOR,CAVERN FLOOR,304,305,CAVERN
 FLOOR,CAVERN FLOOR,CAVERN FLOOR
,309,310
20095 DATA CAVERN FLOOR,CAVERN F
LOOR,CAVERN FLOOR,314,315,CAVERN
 FLOOR,CAVERN FLOOR,318,CAVERN F
LOOR,CAVERN FLOOR
20100 DATA CAVERN FLOOR,TEMPLE,T
EMPLE STEPS,CAVERN FLOOR,CAVERN
FLOOR
20120 DATA 1514,11,1515,1,1516,1
8,1517,18,1518,1,1519,11,1520,45
,1521,16,1522,1,1523,18,1524,20,
1525,50
30000 REM
30105 AJ=0
30110 O=16:T=0:PRINT@384,"THE GO
BLIN IS ATTACKING":AE=1:D(11)=3
30115 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRACK'S STRENGTH=":PRINT@308,AI:
PRINT@340,AG
30120 IFB=2ANDH$=C$(1)THENX=RND(
4):IFX=1THENPRINT@256,"WE BOTH H
IT":AH=AH-3:AG=AG-3:ELSEIFX=2THE
NPRINT@256,"I HIT HIM":AH=AH-3:E
LSEIFX=3THENPRINT@256,"I MISSED-
HE DIDN'T":AG=AG-3:ELSEPRINT@256
,"WE BOTH MISSED"
30125 IFB=11ANDH$=C$(4)THENX=RND
(4):IFX=1THENPRINT@256,"WE BOTH
STRUCK":AH=AH-2:AG=AG-2:ELSEIFX=
2THENPRINT@256,"I GOT HIM":AH=AH
-2:ELSEIFX=3THENPRINT@256,"HE CL
UBBED ME":AG=AG-2:ELSEPRINT@256,
"WE BOTH MISSED"
30126 IFB=11ANDH$=C$(4)ORB=2ANDH
$=C$(1)THEN30130
30127 PRINT@256,"HE HIT MY ARM W
ITH HIS HAND AX":AG=AG-2:GOTO302
00
30130 X=RND(100):IFX>97THENPRINT
@416,"I TRIPPED,HE SMASHED MY SK
ULL   KARRAK IS DEAD":PRINT@340,
"O":FORX=1TO5000:NEXT:CLS:END
30135 X=RND(100):IFX>96THENPRINT
@416,"HIS MACE SLIPPED OUT OF HI
S HANDI SKEWERED HIM CLEANLY":AH
=0
30200 PRINT@308,AH:PRINT@340,AG
30250 IFAG<1ANDAH<1THENPRINT@416
,"BOTH THE GOBLIN AND KARRAK ARE
  DEAD":FORX=1TO2500:NEXT:CLS:EN
D
30300 IFAH<1THENPRINT@256,"THE G
OBLIN IS DEAD":PRINT@384," ":C(1
2)=3:C(13)=3:O=AJ:BF=1:AE=0:GOTO
15000
30400 IFAG<1THENPRINT@256,N$:FOR
X=1TO2000:NEXT:CLS:END
30499 GOTO15000
30500 REM
30505 IFAC=1THEN15000
30507 AJ=0
30510 O=16:T=0:PRINT@384,"A WOLF
 IS ATTACKING":D(12)=3:AF=1
30513 IFH$=C$(13)THENH$=C$(4)
30514 IFH$=C$(12)THENH$=C$(1)
30515 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRAK'S STRENGTH=":PRINT@308,AH:P
RINT@340,AG
30520 IFC(1)=1ORC(12)=1THENIFB=2
THENX=RND(100):IFX>40THENPRINT@4
48,"A SOLID BLOW!":AI=AI-5:ELSEP
RINT@448,"IT'S TEETH SLASHED MY
LEG":AG=AG-3
30530 IFC(4)=1ORC(13)=1THENIFB=1
1THENX=RND(100):IFX>30THENPRINT@
448,"A SLIGHT WOUND IN IT'S NECK
":AI=AI-2:ELSEPRINT@448,"IT'S TE
ETH RIPPED MY ARM":AG=AG-2
30535 PRINT@308,AI:PRINT@340,AG
30540 IFB<>2ANDB<>11THENPRINT@44
8,"IT'S TEETH CUT MY ANKLE":AG=A
G-2
30550 IFAI<1THENPRINT@256,"THE W
OLF IS DEAD":PRINT@384," ":BG=1:
O=AJ:AF=0:GOTO15000
30560 IFAG<1THENPRINT@288,H$:FOR
X=1TO2000:NEXT:CLS:END
30999 GOTO15000
```

Rainbow Check Plus

```
1080 ..... 0292  12
2061 ..... 052C  234
3003 ..... 0795  36
3999 .... 0AB0   87
5080 ..... 0E6F  42
20049 .... 1262  78
30120 .... 165B  169
30510 .... 196C  219
END .... 1D4A    218
```

Listing 4

```
100 CLS(0):DIMB$(20),C$(20),C(20
),D$(20),D(20),A1$(25),A2$(25),A
3$(25),KA(12),AK(12)
110 CLS(0):AI=12:LV=100:HV=0:VV=
5:P=105:AH=12
1000 IFMV=0THEN2000
1001 Q=P-LV:PRINT@9,A1$(Q)
1002 IFP=105THEN1010
1003 X=RND(4):IFX=4THENGOSUB5000
0:PRINT@457,"-AND RAN OFF"
1010 IFP=105ANDCA=0THENPRINT@288
,"A DWARF SLAMMED THE TEMPLE DOO
```

```
R SHUT AND RAN OFF TO THE NORTH"
:O=1:T=0:D(1)=3:CA=1:GOTO15000
1015 IFP=105THEND(1)=3:O=1
1020 IFP=101THENO=2:T=2:D(2)=3
1030 IFP=102THENT=0:O=5
1040 IFP=103ANDCB=0THENO=5:D(1)=
3:PRINT@288,"THERE IS A CLOSED D
OOR TO THE   EAST":GOTO15000
1050 IFP=103THENO=11:D(1)=3:PRIN
T@288,"THE DOOR TO THE EAST IS O
PEN"
1060 IFP=104THENO=5
1070 IFP=108THENO=10
1080 IFP=113THENO=10:T=0:D(3)=3:
PRINT@288,"THROUGH AN ARCHWAY TO
 THE EAST,ISEE AN ALTAR"
1090 IFP=118ANDCD=0THENO=4:D(3)=
3:D(4)=3:PRINT@288,"I AM AT THE
ALTAR,IT IS AT THE  TOP OF FIVE
STEPS":GOTO15000
1100 IFP=118THENO=4:T=2:PRINT@28
8,"THE HIDDEN STAIRWAY IS VISIBL
E":D(2)=3:D(3)=3
1999 GOTO15000
2000 REM
2010 IFP=105ANDB=8ANDJ=1THENPRIN
T@288,"WON'T BUDGE":GOTO150
2020 IFB=1THENIFD(J)=3ORD(J)=P T
HEN2030
2025 GOTO2100
2030 IFJ=1ANDP=105THENPRINT@288,
"SOLID BRONZE,A TURTLE IN RELIEF
 IN THE CENTER":GOTO150
2035 IFJ=1ANDP=103 OR J=1ANDP=10
8THENPRINT@288,"OAK,HEAVY BLACK
METAL STRAPS":GOTO150
2040 IFP=118ANDJ=3THEN2045ELSE20
60
2045 IFCD=1THENPRINT@352,"STEPS
LEAD DOWN"
2050 PRINT@288,"TURTLE SHAPE,FOU
R LEGS,HEAD+TAIL-ABOUT 20 FEET L
ONG,THREE HIGH":D(9)=3:D(10)=3:D
(11)=3:GOTO15000
2060 IFP=118THEN2061ELSE2100
2061 IFJ=9THENPRINT@288,"MOUTH O
PEN,RUBY INSIDE":D(12)=3:GOTO150
00
2065 IFJ=11THENPRINT@288,"JUST A
 TAIL MADE OF STONE":GOTO150
2070 IFJ=10THENPRINT@288,"FIVE G
OLD CLAWS ON EACH FOOT":D(13)=3:
GOTO15000
2080 IFJ=13THENPRINT@288,"GOLD,T
HREE INCHES LONG":GOTO150
2090 IFJ=2THENPRINT@288,"HAND HE
WN":GOTO150
2095 IFJ=12THENPRINT@288,"FIVE I
NCHES THICK,FACETED":GOTO150
2100 IFP=118ANDB=12ANDJ=14ANDCI=
```


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```
OTHENCI=1:D(12)=0:CD=1:PRINT@288
,"'CLICK'":FORX=1TO1000:NEXT:PRI
NT@320,"THE ALTAR MOVED BACK-REV
EALING  STEPS LEADING DOWN":D(2)
=3:T=2:GOTO15000
2110 IFP=103ANDB=8ANDCB=0THENPRI
NT@288,"'UUMMMMPH'":FORX=1TO1500
:NEXT:PRINT@320,"HEAVY-BUT I GOT
 IT OPEN":O=11:CB=1:GOTO15000
2999 GOTO12990
3000 IFMV=0THEN4000
3001 Q=P-LV:PRINT@9,A2$(Q)
3002 IFP=218ORP=208ORP=203THEN30
10
3003 X=RND(5):IFX=5THENGOSUB5000
0:PRINT@457,"-AND RAN OFF"
3010 IFP=201THENO=3:T=1:D(2)=3
3020 IFP=206THENT=0:O=10
3030 IFP=211THENO=10
3040 IFP=216THENIFCE=1THENPRINT@
288,"THE PANEL IS OPEN":D(5)=3:O
=10:GOTO15000ELSEPRINT@288,"THE
HALL ENDS":O=4
3050 IFP=221THENO=9:D(5)=3:T=0:I
FCE=0THENCE=1:PRINT@288,"A PANEL
 IN THE WAST WALL OPENED AS I AP
PROACHED"
3060 IFP=222THENO=1:T=2:D(2)=3
3070 IFP=203THENPRINT@288,"THE W
HOLE ROOM IS COVERED WITH  A GRE
EN OOZE":FORX=1TO2000:NEXT:PRINT
@320,"A HUGE GLOB FELL ON ME FRO
M THE CEILING!! I CAN'T BREATHE!
!":FORX=1TO3500:NEXT:CLS:PRINT@2
65,N$:END
3080 IFP=208AND CF=1THENO=10:PRI
NT@288,"THE CELL DOOR IS OPEN":D
(1)=3:GOTO15000
3085 IFP=208THENO=3:PRINT@288,"T
HERE IS A DOOR TO THE WEST,THE O
PENING NEAR THE TOP IS BARRED":D
(1)=3:D(16)=3
3090 IFP=213THENO=10:T=0
3100 IFP=218THENO=4:T=2:IFCG=0TH
ENPRINT@288,"I HEARD LAUGHTER-AN
D THE ALTAR  MOVED BACK-THE WAY
UP IS BLOCKEDSOMEHOW I THINK THE
 DWARF DID IT":CG=1:CD=0:CI=0:D(
12)=118
3999 GOTO15000
4000 REM
4010 IFP=216ANDB=13ANDJ=15ANDCE=
0THENPRINT@288,"'RUMBLE'":FORX=1
TO1000:NEXT:PRINT@320,"A PANEL I
N THE EAST WALL SWUNG  OPEN":D(5
)=3:O=10:CE=1:T=0:GOTO15000
4020 IFB=13ANDJ=15THENPRINT@288,
"NOT DOING ANYTHING HERE":GOTO15
0
4030 IFP=208ANDCF=0ANDB=8ANDJ=1T
HENPRINT@288,"THE DOOR OPENED IN
WARD":CF=1:O=10:GOTO15000
4040 IFP=208ANDJ=1ANDB=1THENPRIN
T@288,"ON THE DOOR IS A WARNING-
--      'WHAT IS WITHIN IS MEANT
TO STAYTHERE FOREVER-DISTURB IT
NOT'":GOTO150
4050 IFP=208ANDB=1ANDJ=16THENPRI
NT@288,"THE ENTIRE INSIDE OF THE
 ROOM ISCOVERED WITH A GREENISH
OOZE":D(17)=3:GOTO150
4999 GOTO12990
5000 IFMV=0THEN6000
5001 Q=P-LV:PRINT@9,A3$(Q)
5002 IFP=307ORP=317THENIFAC=0THE
NPRINT@352,"I HEAR SOMETHING RAT
TLING AHEAD!"
5003 IFP=312ORP=313THEN5010ELSEX
=RND(5):IFX=5THENGOSUB50000:PRIN
T@457,"-AND RAN OFF"
5010 IFP=322THENO=4:T=1:D(2)=3:P
RINT@288,"THE STAIRS LEAD UP"
5020 IFP=317THENO=10:T=0
5030 IFP=312ANDAC=0THENAF=1:GOTO
30500THENO=10
5040 IFP=312THENO=10
5050 IFP=307THENO=8
5060 IFP=308THENO=5
5070 IFP=309THENO=6
5080 IFP=314THENO=13:IFAB=0THENP
RINT@288,"I HEAR SOMETHING MOVIN
G AROUND  TO THE NORTH-WHATEVER
IT IS-IT  DOESN'T CARE IF IT IS
HEARD"
5090 IFP=319THENO=7:T=0
5100 IFP=313ANDAB=1THENO=0:T=0:P
RINT@69," ":PRINT@96," ":PRINT@1
28," ":PRINT@288,"THIS IS THE EN
D OF PART THREE  PLEASE WAIT A
MOMENT-":FORX=1TO5000:NEXT:GOTO2
5000
5105 IFP=313THENO=2:T=0:AE=1:GOT
O30000
5110 IFP=318THENO=2:T=1:D(2)=3:C
G=1:PRINT@288,"I THINK I HEARD T
HE DWARF ABOVE"
5999 GOTO15000
6000 REM
12990 IFB=20RB=11THENPRINT@256,"
NO EFFECT":PRINT@288," ":GOTO150
12991 IFB=8ANDC=6THENPRINT@288,"
IT'S ALREADY OPEN":GOTO150
12992 IFB=1ANDC=8ANDC(8)=1THENPR
INT@288,"CROSS-SHAPED":GOTO150
12993 IFB=1ANDC=6ANDC(6)=1THENPR
INT@288,"SMALL,LEATHER":GOTO150
12994 IFB=1ANDC=1ANDC(1)=1THENPR
INT@288,"SOLID BRONZE,3 FEET LON
G":GOTO150
12995 IFB=1ANDC=4ANDC(4)=1THENPR
```

```
INT@288,"NINE INCHES LONG,DOUBLE
 SIDED   BLADE":GOTO150
12997 IFB=1THENPRINT@288,"I DON'
T SEE ANYTHING SPECIAL":GOTO150
12998 PRINT@448,"I CAN'T":GOTO15
0
12999 GOTO12990
20000 DATA LOOK,HIT,PUT,GET,LIST
,DROP,VIEW,OPEN,THROW,UNLOCK,STA
B,CLOSE,PUSH,ZZ,ZZ,ZZ,ZZ,ZZ,ZZ,Z
Z
20020 DATA SWORD,FLINT,ROPE,DAGG
ER,IDOL,POUCH,CHALICE,KEY,SACK,T
ORCH,PENDANT,MACE,HAND AX,14,15,
16,17,18,19,20
20040 DATA DOOR,STAIRS,ALTAR,STE
PS,PANEL,SKELETON,TEMPLE,TURTLE,
HEAD,LEGS,TAIL,RUBY,CLAWS,MOUTH,
WALL,BARS,OOZE,RAT,ZZ,ZZ
20049 REM A2$( )
20050 DATA STAIRWAY,202,CELL,204
,205,HALL,207,PASSAGE,209,210
20055 DATA HALL,212,PASSAGE,214,
215,HALL,217,STAIRWAY,219,220
20060 DATA HALL,STAIRWAY,223,224
,225
20069 REM A1$( )
20070 DATA STAIRWAY,CORRIDOR,COR
RIDOR,CORRIDOR,INSIDE TEMPLE ENT
RANCE,106,107,ANTEROOM,109,110
20075 DATA 111,112,MAIN MEETING
ROOM,114,115,116,117,ALTAR,119,1
20
20080 DATA 121,122,123,124,125
20089 REM A3$( )
20090 DATA 301,302,303,304,305,3
06,TUNNEL,TUNNEL,TUNNEL,310
20095 DATA 311,TUNNEL,CAVERN,TUN
NEL,315,316,TUNNEL,STAIRWAY,TUNN
EL,320
20100 DATA 321,STAIRWAY,323,324,
325
20120 DATA 1514,11,1515,1,1516,1
8,1517,18,1518,1,1519,11,1520,45
,1521,16,1522,1,1523,18,1524,20,
1525,51
30000 REM
30105 AJ=0
30107 IFAG<10THENAG=14
30110 D(18)=3:O=16:T=0:PRINT@384
,"A HUGE RAT IS ATTACKING":AE=1
30112 IFB=2ANDH$=C$(12)THENH$=C$
(1)
30113 IFB=11ANDH$=C$(13)THENH$=C
$(4)
30115 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRACK'S STRENGTH=":PRINT@308,AI:
```


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☆ **MUSICAL STRINGS.** An entertaining tutorial that stimulates muscial creativity and teaches basic computer string variable concepts. After an animated lesson about string variables and an introduction to the Extended Basic PLAY statement, this program turns the keyboard into a piano and lets you create your own musical strings to add to your favorite programs or to simply listen to. The on-screen menus and instructions and the clear, easy-to-understand language make this program great for everyone from 10-year-olds to adults $17.95

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```
PRINT@340,AG
30120 IFB=2ANDH$=C$(1)THENX=RND(
4):IFX=1THENPRINT@256,"I GOT HIM
 AND IT BIT ME":AH=AH-3:AG=AG-3:
ELSEIFX=2THENPRINT@256,"I HIT HI
M":AH=AH-3:ELSEIFX=3THENPRINT@25
6,"I MISSED-HE DIDN'T":AG=AG-3:E
LSEPRINT@256,"WE BOTH MISSED"
30125 IFB=11ANDH$=C$(4)THENX=RND
(4):IFX=1THENPRINT@256,"I DREW B
LOOD-AS DID HE":AH=AH-2:AG=AG-2:
ELSEIFX=2THENPRINT@256,"I GOT HI
M":AH=AH-2:ELSEIFX=3THENPRINT@25
6,"HE BIT MY FLANK":AG=AG-2:ELSE
PRINT@256,"WE BOTH MISSED"
30126 IFB=11ANDH$=C$(4)ORB=2ANDH
$=C$(1)THEN30130
30127 PRINT@256,"IT BIT A CHUNK
FROM MY ARM":AG=AG-2:GOTO30200
30130 X=RND(100):IFX>97THENPRINT
@416,"I TRIPPED,HE TORE OPEN MY
CHEST KARRAK IS DEAD":PRINT@340,
"0":FORX=1TO5000:NEXT:CLS:END
30135 X=RND(100):IFX>96THENPRINT
@416,"IT SLIPPED ON THE WET FLOO
R-I   FINISHED IT OFF":AH=0
30200 PRINT@308,AH:PRINT@340,AG
30250 IFAG<1ANDAH<1THENPRINT@416
,"BOTH THE RAT AND KARRAK ARE DE
AD":FORX=1TO2500:NEXT:CLS:END
30300 IFAH<1THENPRINT@256,"THE R
AT IS DEAD":PRINT@384," ":O=AJ:B
F=1:AE=0:D(18)=3:AB=1:FORX=1TO20
00:NEXT:GOTO5100
30400 IFAG<1THENPRINT@256,N$:FOR
X=1TO2000:NEXT:CLS:END
30499 GOTO15000
30500 REM
30505 IFAC=1THEN15000
30507 AJ=0
30510 O=16:T=0:PRINT@384,"A SKEL
ETON IS ATTACKING-IT HAS ASWORD"
:D(6)=3:AF=1
30515 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRAK'S STRENGTH=":PRINT@308,AH:P
RINT@340,AG
30520 IFC(1)=1ANDB=2THENX=RND(10
0):IFX>50THENPRINT@448,"I HIT IT
":AI=AI-3:ELSEPRINT@448,"IT SLAS
HED MY ARM":AG=AG-5
30525 IFC(12)=1ANDB=2THENX=RND(1
00):IFX>30THENPRINT@448,"I SMASH
ED A FEW BONES":AI=AI-5:ELSEPRIN
T@448,"IT CUT MY LEG":AG=AG-5
30530 IFC(4)=1ANDB=11THENPRINT@4
48,"THE DAGGER ISN'T GOING TO HE
LP"
30535 IFC(13)=1ANDB=11THENX=RND(
100):IFX>50THENPRINT@448,"'CRUNC
H'":AI=AI-3:ELSEPRINT@448,"IT CU
T MY ARM":AG=AG-2
30540 IFB<>2ANDB<>11THENPRINT@44
8,"IT CUT MY NECK":AG=AG-2
30541 PRINT@308,AI:PRINT@340,AG
30550 IFAI<5THENPRINT@256,"THE S
KELETON RAN AWAY":PRINT@416," ":
PRINT@384," ":O=AJ:AF=0:AC=1:D(6
)=0:GOTO15000
30560 IFAG<1THENFORX=1TO2000:NEX
T:CLS:PRINT@264,N$:END
30570 GOTO150
30999 GOTO15000
50000 CH=CH+1:IFCH<4THENPRINT@41
6,"THE DWARF THREW A ROCK AND HI
T":X=RND(3):IFX=1THENPRINT@448,"
MY HEAD":RETURNELSEIFX=2THENPRIN
T@448,"MY LEG":RETURN:ELSEIFX=3T
HENPRINT@448,"MY BACK":RETURN
50010 IFCH<6THENPRINT@384,"THAT
PESKY DWARF IS STILL AROUNDHE JU
ST SHOT AN ARROW AT ME-IT  MISSE
D":RETURN
50020 IFCH<10THENPRINT@416,"THAT
 DWARF IS A PAIN-HE GESTUREDRUDE
LY":RETURN
50030 PRINT@416,"THE DWARF MUST
BE TIRING,HE JUSTAPPEARED":RETUR
N
```


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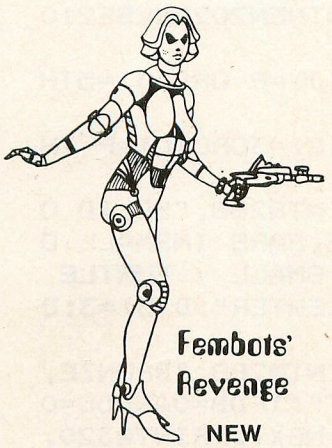

Fembots' Revenge

NEW

3-D GRAPHIC ADVENTURE

Shooting aliens on a flat screen is nothing like BEING THERE. In machine-code 3-D excitement, highest resolution graphics and sound, you are face to face with the Guardians: the ubiquitous Fembots, the powerful Arthroks and the omnipotent Optikon. Your lasgun blasting, you hear the explosion and the crunching metal; you feel the tension as you stalk your enemy, searching for the Destruct Button on your way to the Master Bay of the Mother Ship. Can you find the means to teleport to safety?

32K Tape $24.95 32K Disk $29.95

KOMET-KAZE

Another arcade hit! The Asteroid Belt is crashing down on Earth. You are the first-line defense. You must destroy the blazing asteroids and the homing orbs with your disruptor. Machine-code speed, multi-colors on a black background - the crash and explosions of the asteroids rain on your senses!

16K Tape $19.95 32K Disk $24.95

Coming Soon

THE SENTINEL

3-D GRAPHIC ADVENTURE

A dark, awful secret is hidden in the cavernous labyrinth. Beyond the chasms, the poisonous gasses, Tunnels of No Return and the relentless minions, the Sentinel hungrily awaits! Sorcerous magick and saintly swordplay are your best friends and worst enemies. You are no ordinary warrior in this ultra hi-res, 3-D medieval adventure! Can you survive to discover the secret - or is there a seat in the netherworld for you too?

32K Tape $24.95 32K Disk $29.95

Xygoid

NEW

Your ship is being enshrouded by the Xygoid Web. Certain death is minutes away! You must blast through the enveloping Web and destroy the Xygoid vessel before you are crushed. This is a multi-colored machine-code game in the highest resolution mode on a black background. Xygoid, from the galactic beginning! It will ensnare your mind!

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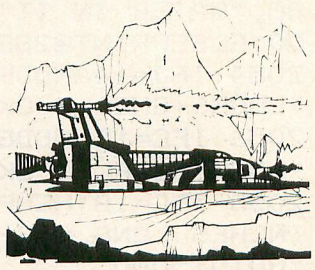

INTERCEPTOR

Ever increasing Waves of Landers, Fighters, Air mines and Smartbombs help the enemy capture the Earthlings on the planet surface. Your phaser and photon bombs will be a solid defense. In multi-colored surroundings you do battle to maintain control of your homebase!

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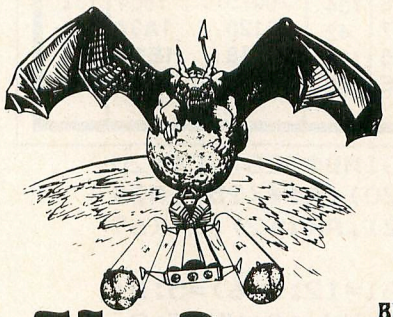

Fyr-Draca

NEW ARCADE GAME

Fyr-Draca (Fire Dragons), from egg to the daemonic behemoth, greet you in five waves with nine colors on the screen at one time! This machine code game is going to sweep the Color Computer market. It is by far, the best game to come out for a long, long time. The real arcade look is here at last!

Fire Dragons uses the nine color mode to create a screen of dazzling color with a black background and a black border. Dragons swoop from their stellar watch, singly, in groups and in squadron formation. First you face the single wyrms, then the squadron, next the twin giants, followed by the Battle Drake and its minions. Even with four star vessels and shields you will be hard put to survive their spitting fire and diving attacks!

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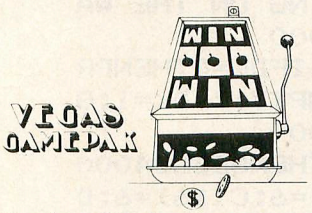


VEGAS GAMEPAK

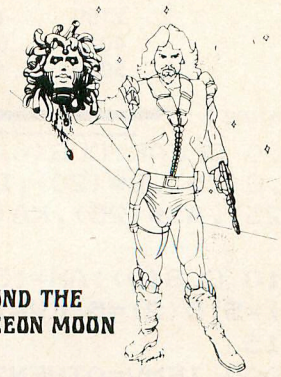
Why fly to VEGAS when you can have a casino at home! The VEGAS GAMEPAK is five action packed games with great graphics & sound. SLOT MACHINE - BLACKJACK - UP AND DOWN THE RIVER - CRAPS & KENO.

16K Tape $19.95 16K Disk $24.95

MS. NIBBLER

Ms. Nibbler is not just another pretty face with glossy red lips. She's a feisty lady, who moodily prowls her black maze. This game has the real arcade action and the real arcade look too! Your joystick will almost burn out as you try to keep up!

16K Tape $19.95 16K Disk $24.95



BEYOND THE CIMEEON MOON

3-D GRAPHIC ADVENTURE

A dead star . . . A derlict vessel . . . or is it? Trapped within you must venture the corridors; defend yourself against the merciless gauntlet of agents of the machine mind. A real-time, high-res, 3-D science fiction adventure game of mind-blowing magnitude.

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Adventure Trilogy

3-D GRAPHIC ADVENTURE

Clash steel with thy foe in the arena of gore. Proved worthy, go in quest of the elusive Eye of Dazmor. If ye findest the orb, hast ye the might to ward off skem and the fortitude to restore the Eye? The ultimate high-res, 3-D quest for even the most experienced adventurer!

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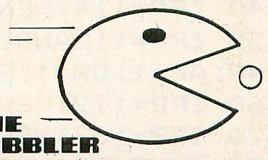

THE NIBBLER

The King of Pac games is here. This fast-paced maze-chase game will challenge the most skilled. You guide The Nibbler through the maze, the portals, onward to the Energy Pills. Then the Ghouls, constantly at your heels, will end up in your belly! The better you get the better you have to become to master the blazing speed. You haven't pushed your skill until you've tried this one!

16K Tape $19.95 16K Disk $24.95

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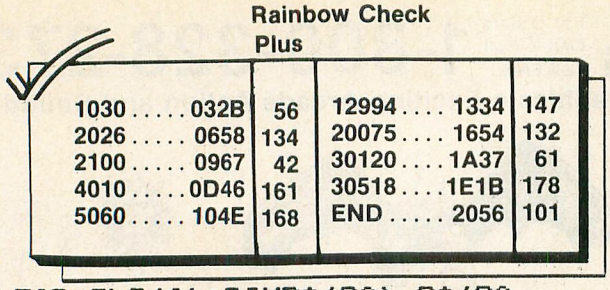

1030 ..... 032B	56	12994 1334	147
2026 0658	134	20075 1654	132
2100 0967	42	30120 .... 1A37	61
4010 ..... 0D46	161	30518 .... 1E1B	178
5060 ..... 104E	168	END 2056	101

Listing 5

```
100 CLEAR:CLS(0):DIMB$(20),C$(20
),C(20),D$(20),D(20),A1$(25),A2$
(25),A3$(25),KA(12),AK(12),EK(69
)
110 CLS(0):AH=15:AI=12:D(6)=5:D(
7)=5:D(2)=5:LV=100:HV=10:VV=5:P=
115
1000 IFMV=0THEN2000
1001 Q=P-LV:PRINT@9,A1$(Q)
1002 IFDJ=0THENFORX=1TO69:READEK
(X):NEXT:DJ=1
1005 IFP=115ANDDA=0THENFORX=1TO2
0:IFC(X)=1THENC(X)=113
1006 IFP=115ANDDA=0THENNEXTX
1010 IFP=115ANDDA=0THENH=0:PRINT
@288,"THAT DWARF CAME OUT OF NOW
HERE  AND HIT ME OVER THE HEAD-W
HEN I WOKE UP,I FOUND MYSELF IN
THIS  DUNGEON CELL.IN THE NORTH
WALL  IS A DOOR":DA=1:O=0:T=0:D(
1)=3:C(16)=3:C(17)=3:GOTO15000
1020 IFP=115ANDDC=0THENO=0:T=0:D
(1)=3:GOTO15000
1023 IFP=115ANDDU=1THENO=1:PRINT
@288,"THERE IS WRITING ON THE WA
LL!":D(17)=3:GOTO15000
1025 IFP=115THENO=1:IFDK=0THENPR
INT@288,"IT'S NOW EMPTY!":DK=1:G
OTO15000ELSEGOTO15000
1030 IFP=114ANDDC=0THENGOSUB4000
0:O=5:DC=1:H=0:C(15)=6:C(16)=6:D
(6)=6:C(17)=6:C(18)=6:D(1)=6:D(4
)=6:D(5)=6:D(7)=6:D(8)=6:D(9)=6:
D(14)=6:GOTO15000
1040 IFP=114THENO=5
1050 IFP=112ANDDN=0THENIFAC=0THE
NO=9:AF=1:DN=1:GOTO30500
1060 IFP=112THENO=9:T=0
1070 IFP=107THENO=3:T=2:D(11)=3:
IFDQ=0THENPRINT@288,"IT DISSIPAT
ED!":DQ=1:IFDP>0ANDDM>0ORDP>0AND
DR>1THENPRINT@320,"I FEEL WEAKER
"
1080 IFP=110THENPRINT@288,"TO TH
E WEST I SEE THE GREEN VAL-LEY O
F BLENFORS":O=4:T=2:D(12)=3:D(11
)=3
1090 IFP=105THENFORX=1TO1000:NEX
T:CLS:PRINT@256," KARRAK HAS BEE
N SUCCESSFUL IN                HIS
QUEST":FORX=1TO5000:NEXT:END
1999 GOTO15000
2000 REM
2010 IFP=115ANDDC=0THEN2020ELSE2
500
2020 IFB=1THEN2021ELSE2100
2021 IFC<>0ORJ<>0THEN2022ELSE210
0
2022 IFD(J)=3ORD(J)=P ORD(J)=5TH
EN2024
2023 IFC(C)=1ORC(C)=3ORC(C)=P TH
EN2024ELSE2100
2024 IFJ=1THENPRINT@288,"SOLID O
AK,MASSIVE HINGES,BARS INSMALL O
PENING IN DOOR.A SMALL  TURTLE
CARVED INTO THE CENTER":D(5)=3:D
(4)=3:GOTO15000
2026 IFJ=4THENPRINT@288,"BRONZE,
THICK AS MY WRIST":IFDB=0ANDDC=0
THENFORX=1TO1000:NEXT:PRINT@320,
"FAR DOWN THE HALL IS A PILE OF
 OBJECTS-IT MAY BE MY STUFF":GOT
O150:ELSEGOTO150
2028 IFJ=5ANDDF=0THENPRINT@288,"
BRONZE,PINS IN PLACE":D(9)=3:GOT
O15000
2029 IFJ=5ANDDF=1THENPRINT@288,"
BRONZE,PINS MISSING":GOTO150
2030 IFJ=8THENPRINT@288,"ABOUT S
IX INCHES DEEP":GOTO150
2032 IFJ=6ANDDE=0THENPRINT@288,"
STRAW COVERED":D(8)=3:GOTO15000
2034 IFJ=6ANDDE=1ANDC(18)=0THENP
RINT@288,"A NAIL":C(18)=3:GOTO15
000
2036 IFJ=9THENPRINT@288,"ONE INC
H THICK,SIX INCHES LONG":GOTO150
2038 IFJ=7THENPRINT@288,"ONE SOL
ID PIECE OF STONE":GOTO150
2040 IFJ=2THENPRINT@288,"LARGE B
LOCKS OF STONE":GOTO150
2050 IFC=17THENIFDG=0THENPRINT@2
88,"BREAD ON IT":C(15)=3:GOTO150
00:ELSEPRINT@288,"EMPTY":GOTO150
2052 IFC=16THENIFDH=0THENPRINT@2
88,"WATER IN IT":D(14)=3:GOTO150
00:ELSEPRINT@288,"EMPTY":GOTO150
2054 IFJ=14ANDDH=0THENPRINT@288,
"LOOKS+SMELLS OK":GOTO150
2056 IFC=15ANDDG=0THENPRINT@288,
"LOOKS+SMELLS OK":GOTO150
2058 IFC=18THENPRINT@288,"EIGHT
INCHES LONG,ONE-HALF INCH THICK"
:GOTO15000
2100 IFB=14ANDC=15ANDC(15)=1THEN
C(15)=5:DG=1:PRINT@288,"'UUUUUMM
MMM'":AG=AG+5:H=H-1:GOTO15000
2110 IFB=15ANDJ=14ANDC(16)=1ANDD
H=0THEND(14)=5:DH=1:PRINT@288,"V
ERY REFRESHING":AG=AG+5:GOTO1500
0
2120 IFB=13ANDJ=9ANDDF=0THENPRIN
```

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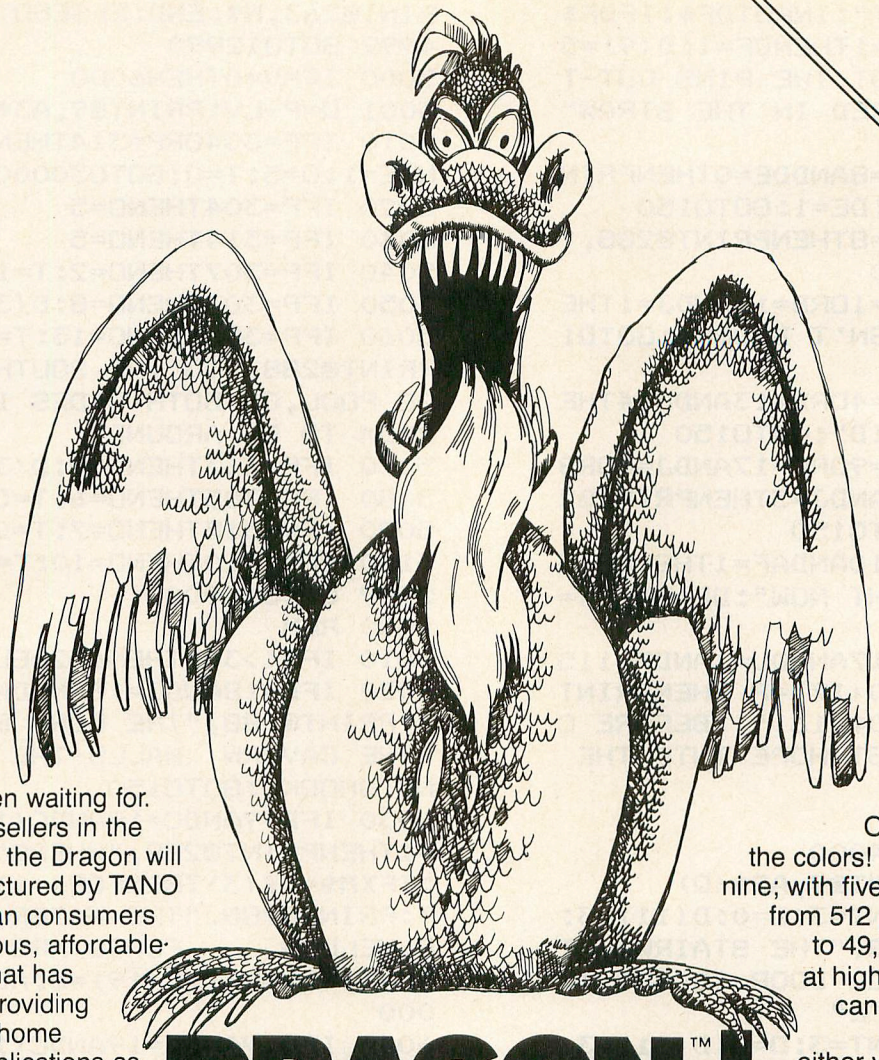

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This, quite literally, is the color computer America has been waiting for. One of the best sellers in the United Kingdom, the Dragon will soon be manufactured by TANO to serve American consumers who want a serious, affordable computer; one that has proven itself at providing educational and home management applications as well as fun and games. To meet this challenge, the Dragon was born. With a standard 64K of RAM. A professional typewriter-style keyboard guaranteed for 20 million key operations. And an impressive array of options which include disk controller and drive, a printer, audio cassette recorder, a modem (RS-232 serial I/O), joysticks, game cartridges and a free BASIC training manual.

Using the new 6809E Microprocessor (a great advance on the original 6502 still used by our competition), the Dragon brings advanced computer functions well within your reach. And priced below $400, it's anything but expensive.

But these aren't the only points of difference with which our Dragon roars. Unlike most units, the Dragon gives Extended Microsoft™* Color BASIC as its standard language while the competition is still stuck in Microsoft™* BASIC training. The Dragon's advanced graphics features include set, line, draw, circle, paint, print @ and print using. Of course the Dragon also features advanced sound capabilities.

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And full editing features allow you to insert, delete or change at will.

Oh yes — don't forget the colors! The Dragon features nine; with five different resolutions from 512 points of text (16x32) to 49,152 points (256x192) at high resolution. And you can view these amazing phenomena through either your composite video color monitor or VHF TV.

So goes the Dragon's story. If you'd like to know more, just mail the coupon or call George Merchant (our Director of Marketing) toll free at 1-800-327-7671. Software developers and dealer inquiries are welcome. The Dragon is destined to become legend as America discovers its great performance is no myth.

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```
T@288,"WITH WHAT":INPUTDF$:IFDF$
=C$(18)ANDC(18)=1THENDF=1:D(9)=5
:PRINT@288,"I GOT THE PINS OUT-T
HEY DISAP-  PEARED IN THE STRAW"
:GOTO15000
2140 IFB=16ANDJ=8ANDDE=0THENPRIN
T@288,"'CLINK'":DE=1:GOTO150
2150 IFB=16ANDJ=8THENPRINT@288,"
NOTHING":GOTO150
2160 IFB=17ANDJ=10RB=13ANDJ=1THE
NPRINT@288,"DOESN'T BUDGE":GOTO1
50
2170 IFB=17ANDJ=40RB=13ANDJ=4THE
NPRINT@288,"SOLID":GOTO150
2180 IFB=17ANDJ=90RB=17ANDJ=50RB
=13ANDJ=90RB=13ANDJ=5THENPRINT@2
88,"NOTHING":GOTO150
2500 IFB=1ANDJ=10ANDAF=1THENPRIN
T@256,DM$;" RIGHT NOW":DP=DM:DR=
DR+1:GOTO150
2510 IFB=1ANDJ=17ANDDU=1ANDP=115
THENIFD(17)=30RD(17)=P THENPRINT
@288,"INVOKE '"D$(16)"' BEFORE C
ASTING  YOUR LAST HOPE INTO THE
WATERS":GOTO150
2999 GOTO12990
3000 IFMV=0THEN4000
3001 Q=P-LV:PRINT@9,A2$(Q)
3010 IFP=207THENT=3:O=0:D(11)=3:
D(1)=3:PRINT@288,"THE STAIRWAY T
URNS HERE.A SMALL DOOR IS SET IN
TO THE SOUTH WALL"
3020 IFP=210THENT=3:O=0:D(11)=3
3999 GOTO15000
4000 REM
4010 IFB=1ANDJ=1THENPRINT@288,"E
IGHT INCHES SQUARE,A PULL KNOB O
N THE RIGHT SIDE.ON THE DOOR ISA
 BROWN STAIN-IT LOOKS LIKE      D
RIED BLOOD":D(13)=3:GOTO15000
4020 IFB=1ANDJ=13ANDDU=0THENPRIN
T@288,"A SMALL PIN WITH A GREEN
STAIN  ON THE END IS STICKING OU
T. I   CAREFULLY REMOVED IT":DU=
1:GOTO150
4030 IFB=1ANDC=19ANDC(19)=1THENP
RINT@288,"YELLOW LIQUID INSIDE":
GOTO150
4040 IFDT=0THENIFB=80RB=17THENIF
J=10RJ=13THENIFDU=0THENPRINT@288
,"SOMETHING PRICKED MY FINGER":F
ORX=1TO3000:NEXT:CLS:PRINT@265,N
$:END:ELSEPRINT@288,"THERE IS A
VIAL OF CLEAR LIQUID INSIDE":C(1
9)=3:DT=1:GOTO15000
4050 IFB=15ANDC=19ANDC(19)=1THEN
C(19)=5:PRINT@288,"THE "C$(19)"
DISAPPEARED!":H=H-1:AG=AG/2:PRIN
T@320,"MY THROAT IS BURNING!":IF
AG<.5THENFORX=1TO3000:NEXT:CLS:P
RINT@263,N$:END:ELSEGOTO15000
4999 GOTO12990
5000 IFMV=0THEN6000
5001 Q=P-LV:PRINT@9,A3$(Q)
5010 IFP=304ORP=314THENIFAB=0THE
NAE=1:O=5:T=0:GOTO30000
5020 IFP=304THENO=5
5030 IFP=314THENO=5
5040 IFP=307THENO=2:T=1:D(11)=3
5050 IFP=303THENO=8:D(3)=3
5060 IFP=308THENO=13:T=0:D(3)=3:
PRINT@288,"TO THE SOUTH IS A LAR
GE POOL,ON BOTH SIDES IS ENOUGH
ROOM TO GO AROUND"
5070 IFP=313THENO=9:D(3)=3
5080 IFP=305THENO=6:T=0:D(3)=3
5090 IFP=315THENO=7:T=0:D(3)=3
5100 IFP=310THENO=10:T=1:D(11)=3
5999 GOTO15000
6000 REM
6010 IFP<>307THEN6020ELSE12900
6020 IFB=18ANDJ=16ANDDW=0THENDW=
1:PRINT@288,"THE WORD ECHOED OFF
 THE CAVERN  WALLS-THE VERY GROU
ND SHOOK":GOTO150
6030 IFB=9ANDC=19ANDC(19)=1ANDDW
=1THENPRINT@288,"WHERE":INPUTXM$
:IFXM$=D$(3)THENFORX=1TO1200:NEX
T:PRINT@288,"THE WATER IS BOILIN
G,YELLOW      FUMES ARE RISING FR
OM IT":H=H-1:C(19)=5:AB=1:GOTO15
000
6040 IFB=9ANDC=19ANDC(19)=1THENP
RINT@288,"WHERE":INPUTXM$:IFXM$=
D$(3)THENPRINT@384,"'SPLASH'":H=
H-1:C(19)=5:GOTO15000
12990 IFB=20RB=11THENPRINT@256,"
NO EFFECT":PRINT@288," ":GOTO150
12991 IFB=8ANDC=6THENPRINT@288,"
IT'S ALREADY OPEN":GOTO150
12992 IFB=1ANDC=8ANDC(8)=1THENPR
INT@288,"CROSS-SHAPED":GOTO150
12993 IFB=1ANDC=6ANDC(6)=1THENPR
INT@288,"SMALL,LEATHER":GOTO150
12994 IFB=1ANDC=1ANDC(1)=1THENPR
INT@288,"SOLID BRONZE,3 FEET LON
G":GOTO150
12995 IFB=1ANDC=4ANDC(4)=1THENPR
INT@288,"NINE INCHES LONG,DOUBLE
 SIDED   BLADE":GOTO150
12997 IFB=1THENPRINT@288,"I DON'
T SEE ANYTHING SPECIAL":GOTO150
12998 PRINT@448,"I'M UNABLE TO D
O THAT NOW":GOTO150
12999 GOTO12990
20000 DATA LOOK,HIT,PUT,GET,LIST
,DROP,VIEW,OPEN,THROW,UNLOCK,STA
B,CLOSE,PUSH,EAT,DRINK,MOVE,PULL
,SAY,JUMP,CRAWL
20020 DATA SWORD,FLINT,ROPE,DAGG
```

```
ER,IDOL,POUCH,CHALICE,KEY,SACK,T
ORCH,PENDANT,MACE,HAND AX,SCROLL
,BREAD,CUP,PLATE,NAIL,VIAL,COIN
20040 DATA DOOR,WALL,POOL,BARS,H
INGES,FLOOR,CEILING,STRAW,PINS,C
LOUD,STAIRS,VALLEY,KNOB,WATER,TU
RTLE,ELTRUT,WRITING,FUMES,PRYBAR
,HAMMER
20049 REM A2$( )
20050 DATA 201,202,203,204,205,2
06,LANDING,208,209,STAIRWAY
20055 DATA 211,212,213,214,215,2
16,217,218,219,220
20060 DATA 221,222,223,224,225
20069 REM A1$( )
20070 DATA 101,102,103,104,OUTSI
DE,106,STAIRWAY,108,109,EXIT
20075 DATA 111,HALL,HALL,HALL,CE
LL,116,117,118,119,120
20080 DATA 121,122,123,124,125
20089 REM A3$( )
20090 DATA 301,302,CAVERN,CAVERN
,CAVERN,306,STAIRWAY,CAVERN,309,
STAIRWAY
20095 DATA 311,312,CAVERN,CAVERN
,CAVERN,316,317,318,319,320
20100 DATA 321,322,323,324,325
20120 DATA 1514,11,1515,1,1516,1
8,1517,18,1518,1,1519,11,1520,45
,1521,16,1522,1,1523,18,1524,20,
1525,52
20140 DATA 73,84,96,77,85,83,84,
96,72,65,86,69,96,66,69,69,78,96
,65,96,77,65,71,73,67,65,76,96,9
6,96,96,96,83,80,69,76,76,109,73
,96,87,65,76,75,69,68,96,82,73,7
1,72,84,96,84,72,82,79,85,71,72,
96,84,72,69,68,79,79,82,97
30000 REM
30105 AJ=0
30107 IFAG<10THENAG=14
30110 D(15)=3:O=16:T=0:PRINT@384
,"AN ENORMOUS TURTLE IS ATTACKIN
G":AE=1
30111 IFDV=0THENPRINT@288,"IT CA
ME OUT OF THE POOL":DV=1
30112 IFB=2ANDH$=C$(12)THENH$=C$
(1)
30113 IFB=11ANDH$=C$(13)THENH$=C
$(4)
30115 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRACK'S STRENGTH=":PRINT@308,AI:
PRINT@340,AG
30120 IFB=2ANDH$=C$(1)THENX=RND(
4):IFX=1THENPRINT@256,"THE SHELL
 IS TOO HARD-IT BIT ME":AG=AG-3:
ELSEIFX=2THENPRINT@256,"A SMALL
```


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* * * * * * * * * * * * * * * * *

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EXECCART is a M/L program that allows you to copy ROMPAC programs to tape. They can then be loaded back into a 64K CoCo and examined or modified. You can run most of your ROMPAC's from disk without ever having to remove the disk controller. This saves tremendous wear and tear on the contacts. EXECCART may also be used to add a loader to your own programs to turn on 64K and to copy your BASIC ROMs into RAM so that you can make modifications.

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* * * * * * * * * * * * * * * * *

THE SPOOLER BY PETER KARWOWSKI

Whenever you use your printer, your computer is totally dedicated to feeding it. This isn't such a problem when you just want to print out a couple of lines, but LLISTing a long program can be very boring. If you have better things to do than sit around waiting for the printer, then "THE SPOOLER" is just what you need. THE SPOOLER will work on ANY TRS-80 Color Computer from a 16K right up to 64K with disks. Extended BASIC is NOT required.

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NEWERROR BY PETER KARWOWSKI

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BONES BY MARK MORAN

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CAT# DM011 16K $12.95 (CAN) $10.95 (US)

Now you can 'Roll Them Bones' on the MC10. We have transferred this popular game without losing any of it's features.

CAT# DM101 4K $12.95 (CAN) $10.95 (US)

SWISS ARMY KNIFE BY RALPH BLOCH

One of our most prolific authors (PRETTY PRINTER-P.U.F.F.-LIBRARY) has come up with another winner. As the namesake of this program has many blades so SAK has many functions. The disk owner will find it indispensable for diagnosing and fixing the many gremlins that attack a disk system. It will work on any number of tracks and can even read FLEX disks. By copying one sector at a time you can often save an otherwise uncopyable disk.

CAT# DM553 32K $29.95 (CAN) $25.50 (US)

MUSIC EDITOR BY PATRICIA SHELTON

This program will take regular sheet music and convert it to "play by number" music. You enter the words, notes and chords from the keyboard and the program will output, to the screen or printer, an easy to read version for C or G type organs. Your files can be edited and saved to disk or tape. Easily produce a songbook of your own favorite tunes.

CAT# DM012 16K $12.95 (CAN) $10.95 (US)

SUPER EDIT BY LARRY LANDWEHR

This powerful new utility program from the author of "IN ASSEMBLY LANGUAGE" adds many new editing commands to Basic. You can PRINT one screenful at a time, DELETE a line or lines, JOIN several lines together and hide your programs, or FIND strings and variables. Also included are commands to INSERT, COPY, MOVE & REPLACE one line or a block of lines. Super edit works with Extended Basic but Extended Basic is not required.

CAT# DM016 16k $19.95 (CAN) $16.95 (US)

HOME INVENTORY BY JEFF PYNE

Home Inventory was written for the average home owner to simplify the tedious task of weeding through his posessions. This small database will save an organised list of brand names, serial numbers, values, dates of purchase etc. This could prove to be your most valuable program if you ever have to deal with an insurance company so be sure you have a copy of the programs output in a save place in case of fire or theft. Ext Basic required-Printer optional

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```
PIECE OF SHELL BROKE OFF":AH=AH-
1:ELSEIFX=3THENPRINT@256,"I MISS
ED-IT DIDN'T":AG=AG-3:ELSEPRINT@
256,"WE BOTH MISSED"
30125 IFB=11ANDH$=C$(4)THENX=RND
(4):IFX=1THENPRINT@256,"NO DAMAG
E AT ALL TO IT":ELSEIFX=2THENPRI
NT@256,"I NICKED IT'S FOOT":AH=A
H-1:ELSEIFX=3THENPRINT@256,"IT S
LASHED MY SIDE":AG=AG-2:ELSEPRIN
T@256,"IT BIT MY LEG":AG=AG-3
30126 IFB=11ANDH$=C$(4)ORB=2ANDH
$=C$(1)THEN30130
30127 PRINT@256,"IT BIT A CHUNK
FROM MY ARM":AG=AG-2:GOTO30200
30130 X=RND(100):IFX>96THENPRINT
@416,"I TRIPPED,IT TORE OPEN MY
CHEST KARRAK IS DEAD":PRINT@340,
"O":FORX=1TO5000:NEXT:CLS:END
30200 PRINT@308,AH:PRINT@340,AG
30250 IFAG<1ANDAH<1THENPRINT@416
,"BOTH THE TURTLE AND KARRAK ARE
  DEAD":FORX=1TO2500:NEXT:CLS:EN
D
30300 IFAH<1THENPRINT@256,"THE T
URTLE IS DEAD":PRINT@384," ":O=A
J:BF=1:AE=0:D(15)=3:AB=1:FORX=1T
02000:NEXT:GOTO15000
30400 IFAG<1THENPRINT@256,N$:FOR
X=1TO2000:NEXT:CLS:END
```


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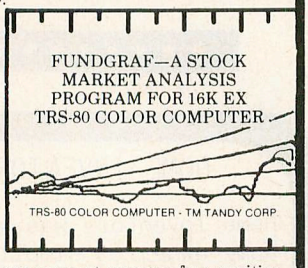

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```
30499 GOTO15000
30500 REM
30505 IFAC=1THEN15000
30507 AJ=0
30510 PRINT@384,"A GASEOUS CLOUD
  IS BLOCKING MY  ADVANCE TO THE
WEST":D(10)=3:AF=1
30515 AG=INT(AG):PRINT@288,"OPPO
NENT'S STRENGTH=":PRINT@320," KA
RRAK'S STRENGTH=":PRINT@308,"?":
PRINT@340,AG
30518 DM$="":DM=RND(9)-1:IFDM=0T
HENDM$="BLACK"ELSEIFDM=1THENDM$=
"GREEN"ELSEIFDM=2THENDM$="YELLOW
"ELSEIFDM=3THENDM$="BLUE"ELSEIFD
M=4THENDM$="RED"ELSEIFDM=5THENDM
$="BUFF"ELSEIFDM=6THENDM$="CYAN"
ELSEIFDM=7THENDM$="MAGENTA"ELSED
M$="ORANGE"
30519 IFDS=0THENDP=DM:IFDM<5THEN
30518ELSEDS=1
30520 IFC(1)=1ANDB=2ORC(12)=1AND
B=2THENPRINT@448,"WENT RIGHT THR
OUGH-NO DAMAGE":AG=AG-DM:IFDM>0T
HENPRINT@256,"I FEEL WEAKER"
30525 IFC(4)=1ANDB=11ORC(13)=1AN
DB=11THENPRINT@448,"NOTHING ACCO
MPLISHED":AG=AG-(DM*1.5):IFDM>0T
HENPRINT@256,"I FEEL WEAKER"
30540 IFB<>2ANDB<>11THENIFA$="S"
THENVV=3:DN=0:O=5:AF=0:D(10)=112
:PRINT@288,"":PRINT@320,"":PRINT
@352,"":PRINT@384,"":PRINT@416,"
":PRINT@448,"":GOTO15000ELSEIFA$
="W"THEN30600ELSE246
30541 PRINT@308,"?":PRINT@340,AG
30560 IFAG<1THENFORX=1TO2000:NEX
T:CLS:PRINT@264,N$:END
30570 GOTO150
30600 AG=AG-DP:IFAG<1THEN30560
30610 AF=0:AC=1:D(10)=5:HV=5:VV=
2:LV=100:P=107:A$="&":GOTO143
30999 GOTO15000
40000 DC=1:FORX=1TO69:POKEX+1311
,EK(X):NEXT:RETURN
```

Listing 6

```
200 FORB=1TO20:WW$=B$(B):WW=INST
R(1,A$,WW$):IFWW>0THENVW=LEN(B$(
B)):GOTO205ELSENEXT:B=0:PRINT@25
6,"I CAN'T DO THAT":GOTO150
205 FORY=1TOVW:MID$(A$,WW,1)=" "
:WW=WW+1:NEXTY
220 FORC=1TO20:WW$=C$(C):WW=INST
R(1,A$,WW$):IFWW>0THENGOTO245ELS
ENEXT:C=0:GOTO235
235 FORJ=1TO20:WW$=D$(J):WW=INST
R(1,A$,WW$):IFWW>0THEN245ELSENEX
T:J=0
```

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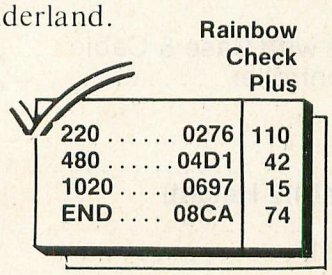
A Winter Wonderland

Program by Andrew L. Shemo

It's that time of year again when you can bundle up and go out in the crisp winter air to make a snowman or sit by the cozy fire and dream about someone else making that snowman — like your CoCo.

Here's a short 16K ECB program sent to us by Andrew L. Shemo of Canton, Ohio that makes your winter wonderland come true. *Winter* is a Hi-Res graphic presentation of a chilly, familiar scene with falling snow, trees and a snowman. If your computer will not accept the high-speed poke *(POKE 65495,0)*, delete lines 460 and 510.

So, build a fire, make some cocoa and let your CoCo draw a winter wonderland.




```
1 '**********************
2 '**** W I N T E R ****
3 '****      BY       ****
4 '** ANDREW L. SHEMO **
5 '****  OCT. 1983  ****
6 '**********************
10 CLS0:PRINT@233,"press"+CHR$(1
28)+"any"+CHR$(128)+"key";
20 IF INKEY$=""THEN 20
30 POKE 65494,0
40 PMODE 2,1:PCLS:SCREEN 1,1:CLS
50 GOSUB 1000
60 '*** GROUND ***
70 CIRCLE(128,185),135,1,.1,.5,1
80 PAINT(128,191),1,1
90 CIRCLE(0,191),105,1,.4
100 PAINT (5,155),1,1
110 '*** BOTTOM ***
120 CIRCLE(125,160),35,1
130 PAINT(115,172),1,1
140 '*** MIDDLE ***
150 CIRCLE(125,120),23,1
160 PAINT(110,130),1,1
170 '***  HEAD  ***
180 CIRCLE(125,92),15,1
190 PAINT(114,96),1,1
200 FORTI=1 TO 500:NEXT
210 '*** EYES ***
220 PRESET(121,88):PRESET(121,89
)
230 PRESET(128,88):PRESET(128,89
)
240 '*** NOSE ***
250 LINE(125,90)-(127,93),PRESET
:LINE -(123,93),PRESET:LINE -(12
5,90),PRESET
260 '*** MOUTH ***
270 CIRCLE(125,95),9,0,.4,0,.5
280 '*** BUTTONS ***
290 FOR Y=105 TO 130 STEP 6
300 PRESET(125,Y):PRESET(125,Y+1
)
310 NEXTY
320 '*** RIGHT TREE ***
330 LINE(245,191)-(245,150),PSET
340 LINE(256,150)-(190,150),PSET
350 LINE -(256,20),PSET
360 PAINT(195,149),1,1
370 '*** LEFT TREE ***
380 LINE(20,150)-(20,140),PSET
390 LINE(29,155)-(29,140),PSET
400 LINE(0,140)-(50,140),PSET
410 LINE -(25,50),PSET
420 LINE -(0,140),PSET
```

(Andrew L. Shemo, an 18-year-old high school graduate, has recently joined the Air Force to enter into electronics and computers. He is a self-taught CoCo enthusiast and this is his first Hi-Res graphics program.)

```
430 PAINT (25,55),1,1
440 '*** BORDER ***
450 FOR Y=0 TO 191:PRESET(256,Y)
:NEXT Y
460 POKE 65495,0
470 FOR X=256 TO 0 STEP-1:PRESET
(X,191):PRESET(X,190):NEXT X
480 POKE 65494,0
490 FOR Y=191 TO 0 STEP-1:PRESET
(0,Y):NEXT
500 '*** SNOW ROUTINE ***
510 POKE 65495,0
520 T=1:S=4:DIM X(255)
530 FOR Y=1 TO T STEP S
540 IF X(Y)=0 THEN 570
550 IF PPOINT(X(Y),Y+1)=5 THEN
GOTO 570
560 PRESET(X(Y),Y):PSET(X(Y),Y+S
,1)
570 NEXT Y
580 T=T+S:IF T>180 THEN T=180
590 FOR C=Y-S TO 1 STEP- S:X(C+S
)=X(C):NEXT C
600 X(1)=RND(250)+2:IFX(1)=125 T
HEN 600 ELSE 530
1000 '*** GRAPHICS STRINGS ***
1010 A$(1)="M+10,+30;R5;M+6,-8;M
+6,+8;R5;M+10,-30;L6;M-7,+22;M-6
,-8;L3;M-6,+8;M-7,-22;L6;BM+45,+
30" 'w
1020 H(1)=32:V(1)=12
1030 A$(2)="U6R6U18L6U6R18D6L6D1
8R6D6NL18;BR6" 'i
1040 H(2)=80:V(2)=12
1050 A$(3)="U30R10;M+10,+25;U25R
6D30L10;M-10,-25;D25L6;BR30" 'n
1060 H(3)=105:V(3)=38
1070 A$(4)="BR12U24L12U6R30D6L12
D24L6;BR25" 't
1080 H(4)=140:V(4)=12
1090 A$(5)="U30R20D6L15D6R10D6L1
0D6R15D6NL20;BR6" 'e
1100 H(5)=175:V(5)=38
1110 A$(6)="U30R15F5D5G5L2M+8,+1
4;D1L5U1;M-8,-12;L3D13L5;BM+5,-2
5;R6F2D3G2L6U6" 'r
1120 H(6)=200:V(6)=12
2000 '*** DRAW "WINTER" ***
2010 DRAW"BM 30,10;"
2020 FOR R=1 TO 6
2030 DRAW A$(R)
2040 NEXT R
2050 FORTI=1 TO 50:NEXTTI
2060 FOR R=1 TO 6
2070 PAINT(H(R),V(R)),1,1
2080 NEXTR:FORTI=1 TO 800:NEXTTI
2090 RETURN
```


WORD PROCESSOR for your Color Computer

only $14.95

Yes! That's right, because we want to create some excitement with an offer you can't pass up — a professional quality full screen oriented word processor that would be a bargain at $50. It's a good one too. Take a look at what you get.

MASTER WRITER's **FULL SCREEN-ORIENTED EDITOR** allows you to move the cursor anywhere in your text using the up, down, right and left arrows. Do this one character at a time or by line or page. Insert, delete or replace text at the cursor watching your changes as you make them. Delete or move blocks of text from one place to another. Merge in text from other files.

AUTOMATIC CARRIAGE RETURN after last complete word on each line, with this and **AUTOMATIC PAGE FEED** you don't have to worry about where a line or page ends — just type!

MASTER WRITER runs on a **16K, 32K,** or **64K COLOR COMPUTER,** taking advantage of all available memory. Use it with **DISK OR CASSETTE** based systems. **EXTENDED BASIC IS NOT REQUIRED.**

EASY TO UNDERSTAND MANUAL has you comfortably using MASTER WRITER in minutes. It is a **USER-FRIENDLY MENU-DRIVEN SYSTEM** with single letter commands. Check any command without having to refer to the manual with the **HELP SCREEN.**

10 PROGRAMMABLE FUNCTION KEYS allow easy insertion of frequently used words or phrases.

WORKS WITH ANY PRINTER. Take full advantage of your printer's special functions such as variable charcter size and emphzsized characters with **EASY EMBEDDING OF PRINTER CONTROL CODES.**

GLOBAL SEARCH function lets you quickly locate specific strings for replacement or deletion.

Customize form letters or standard text with MASTER WRITER'S **EMBEDDED PAUSE** feature. Just "fill in the blanks" when your printer pauses for a personalized appearance.

LIMITED MULTI-TASKING feature lets you print one file while editing another.

In addition to regular text you can use MASTER WRITER to **CREATE BASIC PROGRAMS** with the convenience of full-screen editing.

OTHER FEATURES include easy setting of left, right, top and bottom margin, printer line width, and lines per page. Also auto repeat keys, auto line centering, auto page numbering and choice of display color formats.

And, perhaps one of the best features, is MASTER WRITER's **SUPER LOW PRICE OF $14.95.** At this price you can't go wrong. Buy it today!

TO ORDER send $14.95 for cassette version or $19.95 for disk version plus $2.50 shipping (Calif. residents add 6 % sales tax) to: **PYRAMID DISTRIBUTORS, 527 HILL ST., SANTA MONICA, CA 90405 (213) 399-2222.**

MASTER WRITER

$14.95 Cassette
$19.95 Disk

FUN AND GAMES

TIME PATROL

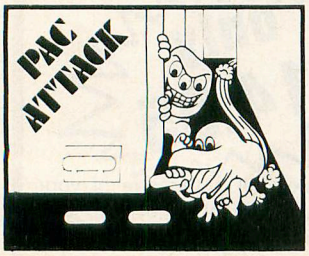
Travel thru different time zones, fending off attacking blimps, helicopters & space crafts from each time period. Become intimate with the full 360 degree firing range of your joystick! (Requires 32K)

(32K Cass) $24.95 *(32K Disk) $27.95*

STORM

A "tempest" of a game, it has 135 levels of play, fast action, graphics & sound. (Requires 16K)

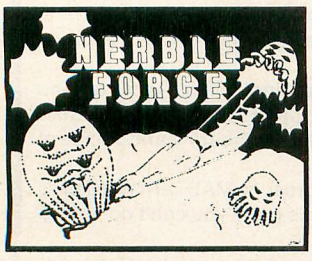
(16K Cass) $21.95 *(16K Disk) $24.95*



COLOR PAC ATTACK II

Three little muggers chase your man relentlessly around a maddening maze as you furiously try to build up points. Perfect replica of your favorite arcade! (Requires16K)

(16K Cass) $24.95 *(16K Disk) $27.95*



NERBLE FORCE

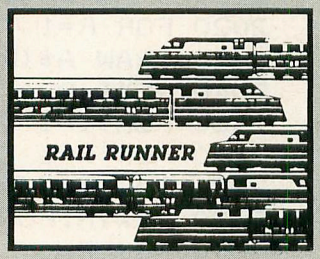
Not just another DEFENDERS. Brilliant graphics show wide angle & close-up views of the city you protect. Use forward & reverse thrusters, long range phasers, & quick maneuvers. Requires only one joystick! (Requires 16K)

(16K Cass) $21.95 *(16K Disk) $24.95*

SHARK TREASURE

Ever been eye-to-eye (or jaw-to-jaw) with a shark? Experience the "excitement" of dodging around the dreaded beasts as a scuba diver after treasure near a sunken galleon. Even if you don't amass wealth you'll enjoy the fine graphics! (Requires 16K)

(16K Cass) $24.95 *(16K Disk) $27.95*



RAIL RUNNER

Hurry! Watch Out!! Oh No!!! Whew! Your railroad engineer must scurry over the track of the busiest train switchyard ever, dodging speeding trains & handcars, to rescue the poor little hoboes on the wrong side of the track! (Requires 16K)

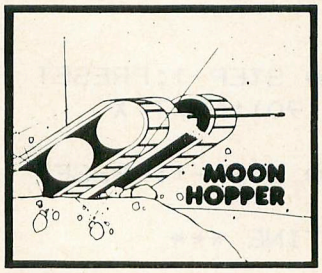
(16K Cass) $21.95 *(16K Disk) $24.95*

SPACE AMBUSH

Stranded on planet Orgath, the first attack of marauding hoodlums left you with no vertical boosters. Galaxy treaties restrict your weapons to short-range phasers. Can your keen eye fend off another attack? (Requires 16K)

(16K Cass) $21.95 *(16K Disk) $24.95*

COMPUTERWARE ®



MOON HOPPER

Roll over the surface with tank-like tractors, hop over any obstacle (cravasses, craters, rocks) & use the phasers (forward and atop) to incinerate attackers as you try to reach Moon Base. High scores shown in 3D space. (Requires 32K)

(32K Cass) $24.95 *(32K Disk) $27.95*

MEGAPEDE

Megapede is exponentially more challenging than CENTIPEDES, caterpillars, & others. Caught in a jungle of algae, you're attacked by vicious fleas, mean spiders, & the relentless centipedes. Shoot your way out, gaining points with every hit. (Requires 16K)

(16K Cass) $24.95 *(16K Disk) $27.95*

JUNIOR'S REVENGE

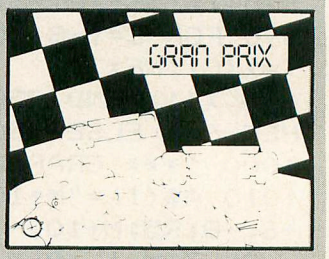
The same Junior you've seen in the Kong arcade series! This young but tireless little ape must overcome four screens of obstacles to rescue his father, The King, from mean old Luigi. He will traverse the jungle & the swamp, climb vines, avoid vine gators, dodge Zuzu birds, open locks, & finally conquer Luigi's hideout before he finally frees his big daddy. (Requires 32K)

(32K Cass) $28.95 *(32K Disk) $31.95*

HYPER ZONE

From the cockpit of your space ship see the 3-D field of hyper space! Dodge oncoming space debris, destroy attacking enemies. The 3-D graphics will have your head dodging approaching objects & listening to things whiz past your windshield! (Requires 32K)

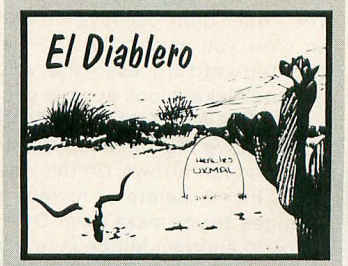
(32K Cass) $24.95 *(32K Disk) $27.95*



GRAN PRIX

Vroom! Your joystick controls the speed & steering as you race over the track, dodging competing cars. Race against the clock & gain points for distance covered. You can almost taste the road dust & smell the burning rubber (Requires 32K)

(32K Cass) $21.95 *(32K Disk) $24.95*



EL DIABLERO

You awake, dazed & confused, in the middle of a desert. You had been learning the techniques of sorcery from an old man from these parts. He told you an evil sorcerer, a diablero, had become his enemy. Now your teacher is missing, you are alone, & you can't seem to remember those techniques. All you recall is the verse . . . (You'll have to play to know the rest! Can you solve the toughest adventure without ordering the clues?) (Requires 16K on cassette or 32K on disk)

(16K Cass) $19.95 *(32K Disk) $24.95*

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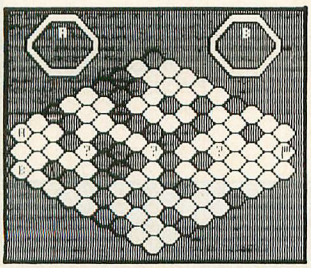
FUN AND GAMES

CLASSICS: COLOROIDS AND COLOR INVADERS

Asteroids & Invaders are arcade classics. In Coloroids, brightly colored asteroids hurdle towards you & you phaser them to bits with a full 360 degree shooting range. Plus you get Color Invaders where you are at the controls of the space tank, firing at stellar ships & invading critters. Two all time greats in one pack! (Requires 16K)

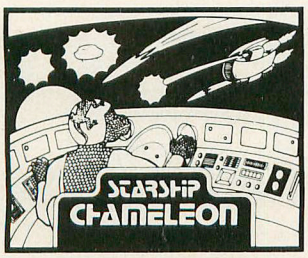
(16K Cass) $19.95 *(16K Disk) $22.95*



MAZERACE AND CAPTURE THE FLAG

Two great board games of luck & strategy. In Mazerace a hexagon matrix is filled with paths & obstacles. You must reach the other side before your opponent. Capture the Flag is similar but runs in real time. Play alone or with a friend. (Requires Ext. BASIC & 16K on cassette or 32K on disk).

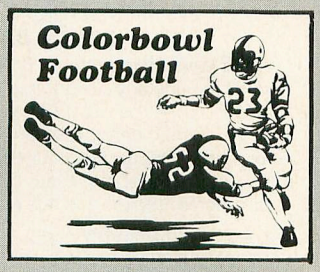
(16K Cass) $19.95 *(32K Disk) $22.95*



STARSHIP CHAMELEON

Your starship changes color at the push of a button to destroy the on-coming super bombs & anti-matter bombs launched by the Gabalatoks above. Watch out for the semi-intelligent aerial bombs that home in on your every move! (Requires 16K)

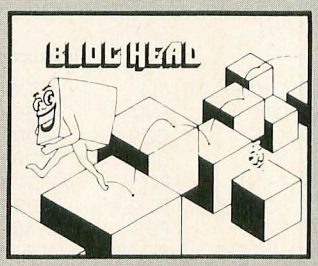
(16K Cass) $21.95 *(16K Disk) $24.95*



COLORBOWL FOOTBALL

Big league graphics start the football season! Two players play against each other or one can sharpen his offense against the computer. Use 8 defensive plays, 9 offensive plays, & many formations to win the Colorbowl! (Requires 32K)

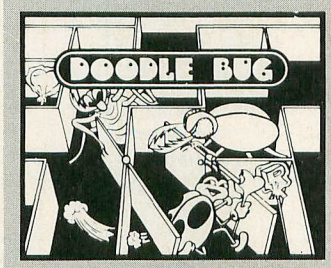
(32K Cass) $24.95 *(32K Disk) $27.95*



BLOC HEAD

Q-BERT never looked so good! You guide Bloc Head from cube to cube, changing the brightly colored surfaces while dodging the dispicable characters that try to push him off! He must clear the cubes to go to the next skill level. (Requires 16K)

(16K Cass) $26.95 *(16K Disk) $29.95*



DOODLE BUG

In hi-res graphics & great sound, your lady bugs hussle through an intricate maze of barriers & turn-styles, trying to earn points by eating the letters, dots, & hearts. Enemy bugs buzz after you! And watch out for the poison skulls! Another arcade favorite! (Requires 16K)

(16K Cass) $24.95 *(16K Disk) $27.95*

BUSINESS APPLICATIONS

WHAT YOU SHOULD KNOW ABOUT COMPUTERWARE® BUSINESS APPLICATIONS

- They have been in use for over 4 years on many 6809 systems. This means they are well tested.
- Complete manuals accompany the systems.
- User-friendly menus make them easy to use.
- They are not accounting tutorials. They assume you know and use sound accounting principles.

System Requirements

- FLEX or OS-9 operating system
- 64K memory
- Computerware® Random BASIC
- Dual Disk Drives (Payroll requires double-sided drives)

GENERAL LEDGER

This is a comprehensive double entry accounting system with complete audit trails, closing procedures, and full reporting. The chart of accounts is flexible and the system easy to use. Reports include the General Ledger, Trial Balance, Balance Sheet, Income Statement, and Transaction Register. Your financial information is at your finger tips!

$249.00

CHECK LEDGER

This is a single entry bookkeeping system which allows the user to define a chart of income and expense accounts. Year-to-date totals are maintained for each account as well as complete checking account history. By just entering your checking account information, you can have always-current visibility over your income and expense ledgers. Financial statements and taxes are a snap!

$195.00

CORRESPONDENCE SYSTEM

We call this the People Manager. It is a very sophisticated people data base system. The system collects name and address information, provides mailing labels or reports of the entire list or any subset upon request. The power of the system lies in the 17 character special code field that is used to identify special characteristics of each person and then can be used to select subgroups for reports and labels used in special marketing or contracts. Tested with data bases of 15 to 9,000 entries this system has been in use with retailers, clubs, churches and professionals for years.

$149.00

INVENTORY CONTROL

This system is designed to help the retailer, distributor, or businessman to keep control of this important factor. It stores your cost and quantity information, updates it immediately, and offers you key management reports with useful summaries at any time. With four costs, four locations, selling history, and vendor information for each item, you will always have the facts!

$195.00

PAYROLL

This is the most comprehensive payroll you'll find on a microcomputer. Besides collecting key employee information, it allows entry of pay rates for standard hours, overtime, and salary. Hourly, salary, and commissioned employees may be paid weekly, bi-weekly, semi-monthly, and monthly. Two types of special monthly deductions are also accommodated. Year-to-date, quarterly, monthly and current totals are maintained. All federal reporting is done automatically and your state computations are also included.

$295.00

ACCOUNTS PAYABLE

This system can give you the tools to plan your business' growth by controlling expenditures and forecasting cash requirements. It helps a small business manage and track its cash liabilities by collecting vendor invoice information and reporting the business' cash committments and payment history.

$195.00

ACCOUNTS RECEIVABLE

All businesses need to know who owes them money! This system provides reliable and timely information regarding the status of all customer accounts. You can know instantly which accounts are past due, forecast how much money to expect to receive for cash flow planning, and keep on top of your customers' credit positions. Customer name, address, credit limit, invoice, and payment information is recorded and reports of all information including customer statements are available upon your request.

$149.00

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PROGRAMMING TOOLS AND LANGUAGES

COLOR PASCAL

Now you can learn about and program in one of the most popular new languages available without investing in a large computer system. Although our Dynasoft PASCAL is not an 'extended' version, the user will find that virtually any task can be accomplished using the commands available plus external calls to your own routines.

What do you get? THE WHOLE THING: COMPILER, P-CODE INTERPRETER, SUPERVISOR, SAMPLE PROGRAMS, PROGRAM EDITOR, — plus a complete instruction manual with examples. Based on a subset of standard PASCAL, it includes most of the standard control structures but omits some of the more sophisticated data structures and floating point arithmetic. The result is a complete high-level language system which retains most of the flavor and structure of standard PASCAL but will run on a system with as little as 32K memory and a cassette. Below is a summary of Color PASCAL's features:

Reserved Words

AND	ARRAY	BEGIN	CASE	CONST	DIV
DO	DOWNTO	ELSE	END	EXTERN	FOR
FORWARD	FUNCTION	IF	MOD	NOT	OF
OR	OTHERWISE	PROCEDURE	PROGRAM	READ	REPEAT
THEN	TO	TYPE	UNTIL	VAR	WHILE
WRITE	WRITELN	NEW	MARK		

Supervisor Commands

Load	Save	Edit	Compile	Go	Gp
Move	Quit				

Editor Commands

New	Top	Bottom	Up	Quit	Down
Dnn	Find	Print	Insert	Kill	Replace

(32K Cass) $49.95

Disk PASCAL includes these added features:

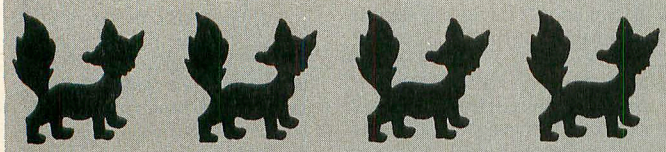
- The compiler can be run in less than 16K, allowing for larger programs. In fact, programs can be larger than memory as code is compiled from the disk.
- Directed I/O allows channeling of the input and output to the screen, printer, or disk. One of the example files provided outputs a file to the screen, printer, or disk at your choice! This means the same program can display, print, or copy files to disk.

***** New Features Available *****

- Complete disk file I/O includes OPEN, CLOSE, CREATE, DELETE, RENAME, FREAD, FWRITE, and even DSIO to read and write to a specific sector!
- Hi-Res color graphics, sound and joystick are supported with procedures such as GMODE, LINE, PCLS, PSET, PPOINT, JOYSTICK, and SOUND.

(32K Disk) $69.95

Save $10 — PASCAL with our great Editor *(32K Disk) $89.95*



FOXY GRAF

FOXY GRAF is a complete graphics development package for the assembly language programmer. The very comprehensive manual covers the history of graphics, how the Color Computer graphics work, details Radio Shack and Motorola would not tell, and is written in an enjoyable style. You can program with any mode in any color combination. It is totally relocatable and includes some very useful subroutines you can call from standard BASIC, (e.g. circles, shapes, etc.) If you are serious about learning graphics programming, Foxy Graf is both a tutorial and a tool! (Requires 16K)

(16K Cass) $29.95 *(16K Disk) $34.95*

COLOR BASIC COMPILER™

If you have ever written a BASIC program only to find that it runs too slow to provide any action and haven't had the courage to learn assembler; then the Color Compiler™ is the answer. It lets you write your program in easy BASIC and then converts it into fast machine language. After you run your compiled program, you may find it necessary to add some delays because the Color Compiler™ will make your program run an average of 40 times faster.

The Color Compiler™ features a total of 46 commands and functions. Most of these are a subset of Extended Color BASIC. The Color Compiler is limited to integer variables. All floating point and string handling can be done in a BASIC program which calls the compiled program. Passing information from BASIC to compiled programs is very easy. The Color Compiler™ generates position independent code so that you may put the compiled program anywhere in memory, including into a ROM-pack! It requires 32K and a disk drive, leaving 16K of user work space.

Functions Supported

ABS	INKEY$	JOYSTK	PEEK	PEEK #
PPOINT	RND	SGN	SQR	TIMER
+	–	*	/	=
v>	v<	AND	OR	NOT

Instructions Supported

CIRCLE	CLS	COLOR	DATA
DIM	END	EXEC	FOR-STEP-NEXT
GET	GOSUB	GOTO	IF-THEN-ELSE
LET	LINE	MOTOR (ON/OFF)	ON n GOTO or GOSUB
PAINT	PCLS	PCOPY	PMODE
POKE	POKE #	PRESET	PRINT
PSET	PUT	READ	REM
RESTORE	RETURN	SCREEN	SOUND

(32K Disk) $39.95

RANDOM BASIC

Computerware®'s Random BASIC has been an industry standard in the 6800 and 6809 industry for many years. Available now on the Color Computer, it brings the following advantages to those using advanced operating systems like FLEX and OS-9.

- Thousands of existing programs are transportable between operating systems
- Extraordinary File Handling Capabilities — ISAM, Random, & Sequential file structures. Fast data file access. Very efficient file design.
- 9 Digits of precision — BCD arithmetic. For those who need extended precision, the OS-9 versions also include an 11 digit version at no extra cost.
- Flexible User Input Commands — "Conversational" programming is a snap with commands designed for easy user input — single character or whole lines.
- Easy Output Formatting — Print Using, automatic pagination, left & right justification, easy columnization and decimal point alignment.
- Programming's Fast — The interpreter provides fast program development and debugging — it is self-documenting with extended variable names. Written by programmer's for programmers!
- OS-9 version supports graphics, sound, & joystick functions!
- In OS-9 version all OS-9 commands are directly accessible, making it easy to write very powerful utilities.
- Write for detailed brochure.

(64K Flex) $75.00
(64K OS-9) $75.00

COMPUTERWARE ®

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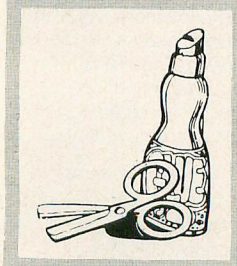
PROGRAMMING TOOLS AND LANGUAGES

DISK UTILITIES WITH REPAIR



Repair

R read a sector into memory buffer
D display buffer to screen by screen type
C change selected byte to a new value
N advance to next sector
P move backward to previous sector
W write buffer to sector on disk
Q display parameter settings
H display command menu
U change drive unit number
G locate & read first sector of granule
F change group of bytes to preset characters
B exit program & return to BASIC

Find display starting, ending & transfer address of binary file

View look at the contents of ASCII file

Print print formatted disk directory to printer or screen

Maskill mass delete with confirm
(Requires 16K disk)

(16K Disk) $24.95

COLOR MONITOR

All keyboard commands consist of a single alphabetic character, possibly followed by one or more arguments. Any of the commands may be aborted by typing a non-hex character (such as "CR") where a hex number is expected. Additionally, the commands that are capable of producing lengthy output may be aborted by typing a "CR" (ENTER) or BREAK on the keyboard; this will be recognized at the time of the line of output, and the system will return to command level. (Requires 16K)

Command Set Summary:

A	Examine & change A register	Q	(not used)
B	Examine & change B register	R	Register display
C	Examine & change CC register	S	Binary Save to cassette
D	Examine & change DP register	T	Text input to memory
E	Echo to RS-232 I/O device	U	Examine & change U register
F	Find a byte string	V	Set breakpoint and begin execution
G	Go to user's program	W	Warm start into BASIC
H	Switch to 64K RAM machine	X	Examine & change X register
I	Initialize memory	Y	Examine & change Y register
J	Jump (subroutine) to addr	Z	Display formatted memory dump
K	Set breakpoint	@	Clear all Breakpoints
L	Binary Load from cassette	__	Use other terminal (RS-232 port)
M	Memory examine & change		Re-open last address opened
N	(not used)	!	List all currently set breakpoints
O	Use Other Terminal	BR	Break operation
P	Exmaine and change PC register		

(32K Cass) $24.95
(32K Disk) $27.95

COLOR CASSETTE ASSEMBLER

Custom developed for the Color Computer, the Color Cassette Assembler supports all 6809 mnemonics, addressing modes along with standard assembler options and directives. It operates as a two pass assembler so both forward and backward references are allowed. To assist you, along with your manual, we include the Motorola Instruction Set Reference Card and documentation on many of the major subroutines in the Color Computer's BASIC. (Requires 32K)

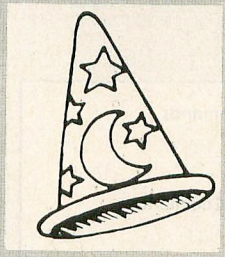
(32K Cass) $24.95

MACRO CONDITIONAL ASSEMBLER
(available for RSDOS, FLEX, & OS-9)

The limitations of previous Color Computer Assemblers are Gone!! MAC not only supports all standard 6809 assembler mnemonics and directives, but also thrives on Macros, Conditional Assembly, Repeat Sequences, inclusion of Source Library Files and much more. To top it off, we've included both our great Assembler Cross Reference program XREF, and a FIND start, end, and execution address of binary files program. In conjunction with our Color Scribe™ this is the most complete set of programming, editing, and documenting tools available.

With Mac the limitations of having to put all source in memory, or having all binary in memory are a thing of the past. Mac can handle any size source input file. And with the LIBS command (included in RSDOS and OS-9 versions), you could even assemble source from up to four drives into one output binary file. The Macro capabilities allow you to create standard subroutines only once, and then simply call them when they are needed. Conditional assembly allows you to have only one multi purpose source file, and then conditionally assemble various versions from one source. How did you get by without Mac? . . . very slowly! (Requires 32K disk)

(32K RSDOS) $49.95 (64K OS-9) $39.00 (64K Flex) $39.00



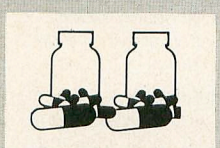
THE SOURCERER

The Sourcerer is a menu driven symbolic 6809 disassembler that produces symbolic source code that can be assembled. It is compatible with most editor/assemblers including Tandy's EDITASM+, Micro Works Macro 80C, and Computerware®'s Macro Assembler. (Requires 16K)

- Symbolic mode provides three modes of operation: Zap, Extended, and Full Symbolic
- Automatic equate generation for labels and symbols outside of disassembly range
- FCC, FCB, and FDB generation (multiple or single FCB and FDB)
- Add or change your FCC, FCB, or FDB table entries between passes
- Written entirely in 6809 machine language for extreme speed. Disassembles any size program in seconds.
- Position independent code is relocatable to any area of memory. Leaves room for object program. Can be located in memory above $8000 if 64K available.
- User defined symbol/label buffer area for maximum flexibility.
- Produces files with or without line numbers.
- Can produce symbolic labels for all extended addresses.
- Included "APPRENTICE" program finds start and end of machine language programs. Disk version also includes FIND and binary COMPARE utilities.
- Disassemble to disk or cassette, printer, or screen.

(64K FLEX) $39.95
(64K OS-9) $39.95

(16K Cass) $34.95
(16K RSDOS Disk) $39.95



COLOR DIAGNOSTICS

The program is menu driven and allows you to check the major functions of the color computer. The six tests included are: **1)** Memory to 32K; **2)** RS-232; **3)** Joysticks; **4)** BASIC ROMS; **5)** Tape I/O; **6)** Sound (Requires 16K)

(16K Cass) $17.95
(16K Disk) $20.95

COMPUTERWARE ®
P.O. Box 668 • Encinitas, CA 92024
(619) 436-3512

EDITORS AND WORD PROCESSORS

Computerware offers a full range of editors and word processors on cassette and disk, including versions for all of the favorite operating systems. Whether you want to edit programs, write letters, or prepare full documents you will find just the right software among these many choices.

Our Color Editor is available on cassette and disk. It is an excellent program editor and can double as a small word processor for cassette users. Disk users looking for a full featured program editor for FLEX or OS-9 will appreciate our Advanced Editor. The ultimate is our Color Scribe Word Processor for the Radio Shack disk. It has all the features for program editing plus is a superb word processor with more sophisticated text formatting capabilities than any other. Read the descriptions below and decide which best fits your needs.

CASSETTE COLOR EDITOR

Whether you're writing BASIC, PASCAL, "C", or assembly language programs, or just writing a letter, the Color Editor can do the job! You can use both the upper & lower case features of the Color Computer, and can print your letters or programs on a printer. It takes full advantage of the keyboard, with many of the commands using the arrow keys without pressing enter. It has change & search commands that work on one or all lines of text, and the ability to copy or move sentences or paragraphs to different locations in your file. You can find & change characters within a line and leave the spacing to the editor. Lines can be inserted, deleted, or moved anywhere with a single command. You can save your entire work or just parts of it and load it later. (Requires 32K)

Line Display / Movement Commands

LIST	PRINT	FIND	TOP	LINE
BOTTOM	UP	DOWN		

Line Modification / Replacement Commands

DELETE	MOVE	COPY	REPLACE	EDIT
ADD	INSERT	SHIFT	BELL	TAB
CHANGE	MARGINS			

Cassette Commands

CLOAD	CSAVE	CWRITE

Special Commands

BREAK	RENUMBER	LNUMBER	BRACKETS	EOL
MACRO	REPEAT	LINE CLEAR	BASIC	EXIT
NEW				

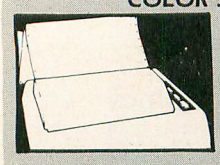
(32K Cass) $24.95

DISK COLOR EDITOR

Available for Radio Shack DOS, this has all of the features of the Color Cassette Editor plus many more. The display has been expanded to 51 x 24 with upper and lower case. Disk commands for saving and loading are added along with the DIR command for easy directory look-up. And since it uses the disk as an extnesion of memory, it is easy to edit files larger than memory! (Requires 32K)

(32K Disk) $29.95

COLOR SCRIBE™ WORD PROCESSOR



COLOR SCRIBE™ is the perfect word processor for letters and documents. It is also great for programming in BASIC, PASCAL, "C", and assembly language. (A special option allows you to disengage the formatter, allowing more free memory for program editing!)

Scribe provides fast change, search, insert, and delete of text. You can move or copy individual lines or entire paragraphs around with a single command. A special feature — it expands your display to 51 x 24 and adds upper and lower case! Over 20 new line editing commands include capabilities like character insert and delete, skip over words, breaking a line, and more! It includes very versatile and easy-to-use formatting of text with right and left margin justification, automatic paging, centering, and tabs, headings and footings, and much more to make formatting your text any way you like a snap! You can even imbed control codes for your printer's special directives.

Since Color Scribe™ uses the disk as an extension of memory, you can easily edit text files larger than memory. You can merge several files of text or program to create a new document or program. Those often used letters, paragraphs, and subroutines need be typed only once! Color Scribe™ will print directly to the printer and/or save to disk. A complete, easy-to-understand manual with examples accompanies your disk. (Requires 32K and one disk drive.)

(32K Disk) $49.95

ADVANCED EDITOR FOR FLEX AND OS-9

This Editor is the perfect program editor for FLEX and OS-9 users. It is also compatible with available text processors for FLEX and OS-9 providing an excellent word processing team! It allows fast change, search, insert, and delete of text. You can move or copy individual lines or entire blocks around with a single command. Since it uses the disk as an extension of memory, it is easy to edit text files larger than memory. You can merge several files to create a new subroutine or program. Those often used calls and subroutines need be typed only once! The Advanced Editor will print directly to the printer and/or save to disk. Over 20 line editing commands including character insert and delete, skip over words, break a line, and more. A complete, easy-to-understand manual with examples is included. (Requires 64K, the FLEX or OS-9 operating system, and one disk drive.)

Line Display & Movement

LIST	PRINT	FIND	TOP	BOTTOM
UP DOWN	LINE			

Line Modification

DELETE	MOVE	COPY	REPLACE	APPEND
INPUT	INSERT	CHANGE	OVERLAY	

Disk Commands

LOAD	SAVE	WRITE	READ	LOG
DOS	MONITOR	MORE TEXT	DO	RETRY

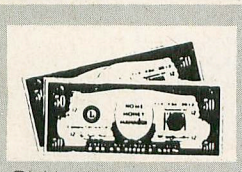
Special Commands

EDIT	BELL	MARGINS	TAB	ESCAPE
RENUMBER	NUMBER	EOL	MACRO	CTL
REPEAT	LINE CLR	BACK SP		

Over 20 Line editing commands also included but not listed.

(64K Flex) $39.00 *(64K OS-9) $39.00*

HOME AND WORK



FINANCE

Divided into two categories, Loans and Investments. It makes laborious financial calculations in a flash, making financial decisions faster and easier! (Requires 16K & Extended BASIC)

Loans program calculates

1) Discount of commercial paper
2) Principal
3) Regular payment
4) Last payment
5) Remaining balance
6) Term of a loan
7) Annual interest rate
8) Mortgage amortization table
9) Declining interest loans

Investment program calculates:

1) Future value
2) Annuity value
3) Regular deposits
4) Regular withdrawals
5) Initial investment
6) Minimum investment
7) Nominal interest rate
8) Effective interest rate
9) Earned interest table

(16K Cass) $17.95
(16K Disk) $20.95

COMPUTERWARE®

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HOME AND WORK

FLEXI-FILER™

This is the most comprehensive and flexible data management system available. It is easy to use and very powerful. (Requires 32K disk & RSDOS.)

Collect: Up to 35 fields per record, with up to 240 characters per record. You designate the name of each field, its position, and its format. (alphanumeric, numeric, money, date, exponential). The size of your database is unlimited — only your disk space will limit your files.

Organize: You determine how the information is displayed and stored. Your format can be changed anytime! Easy screen definition makes data entry simple.

Select: Using logical operators (less than, greater than, equal, and, or) you can select any subset of your data base with up to 36 different criteria.

Sort: All or any selected subset of records can be sorted in ascending or descending order by any of your 35 fields with a very FAST assembly language sort!

Report: Design customized reports and labels to fit your individual needs, including page headings with titles, automatic page numbers, and column headers. Numeric fields can be totaled automatically for summaries too! Printing your information in the format most useful to you is a snap!

Manual: Comprehensive documentation describes every feature and operation in easy to read terms.

(32K Disk) $64.95

SYNTHER7™

Turn your Color Computer into a musical instrument! No special hardware is required except a TV or video monitor with an audio amplifier. The sound is available at the cassette port as well. (Requires 16K)

- Two octave keyboard with twelve octaves to choose from.
- User controls vibrato, bender, boing factor and volume level.
- User controls vibrato pattern, vender rate and attack mode.
- User modifiable attack, sustain, decay and release rates allow virtually any ASDR envelope.
- Fifty stops available. All may be changed and renamed by the user and saved for later use.
- Can be fine tuned to match other instruments or other Color Computers. You could start a band!

(16K Cass) $21.95
(16K Disk) $24.95

SYNTHER 77™

If you have 32K of memory, you can collect a whole library of music by saving your musical creations on cassette or disk with our new Sequencer feature — in addition to all of the features of Synther 7. With the Synther 77™ you can:

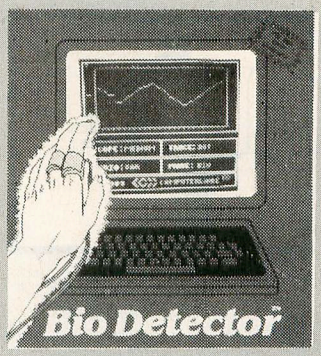
- Record music into memory as you play it. Nearly 2000 individual notes may be stored in 32K. Autorecord allows you to play music until you like it and be sure that it is in memory. Standard record stores music until the buffer is full.
- Play your stored music back. Songs may be played once or continuously.
- LOAD or SAVE stored music to cassette or disk for later playback.
- Stored music may be edited. Change or delete any note and single step through the music to find any mistakes made while recording.

(32K Cass) $27.95
(32K Disk) $30.95

COLOR DATA ORGANIZER

CDO is a little data base system for small inventories, remember lists, serial numbers, etc. It stores, retrieves, sorts, prints, and totals whatever you want within the two 9 digit numeric and two 16 character string entries. It holds 125 records on cassette or 255 on disk. (Requires 16K & a printer.)

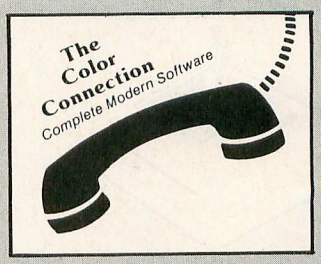
(16K Cass) $19.95
(32K Disk) $29.95



THE BIO DETECTOR

Now you can plug into those secret, personal reactions! Silver finger sensors attach to the Bio Detector unit which plugs into the joystick slot. Your "galvanic skin response" is plotted with hi-res color graphics and sound! Use the Bio Feedback Program as a true health and relaxation aid. The Anxiety Attack Game will provide hours of embarrassing (and truthful) fun! Now when someone asks "what can you computer do?" hook 'em up!! (All hardware, software, and instructions included.) (Requires 16K) Note: Results not admissable in court.

$34.95



THE COLOR CONNECTION

This is the easiest and most complete modem software package available!

- Full and half duplex
- User designated parity
- MACROS for quick log-on and auto dial modems
- Requires only 16K
- Big buffer allows downloading and uploading
- Upload and download text files & set parameters for starting and ending character, & more
- 51 x 24 upper and lower case display with a command line
- The display does not break words when wrapping a line
- 300 baud

Requires 16K on cassette or 32K on disk.

(16K Cass) $34.95
(32K Disk) $39.95

64K SCREEN EXPANDER

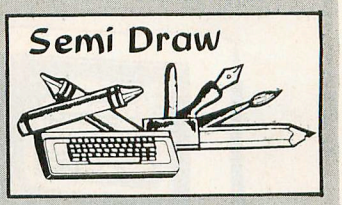
The 64K Color Computer can have a 51 x 24 upper and lower case display without hardware mods! Use it with BASIC and all assembly language programs that use text displays. Included is a character editor so you can change any of the characters. The Screen Expander works by transferring all of the ROMs to RAM and then modifying them to use its new Hi-Res display. It does not affect your software, stays even after resetting, and looks great even on a TV. The PRINT command is also expanded to work with true coordinate positions, (absolute cursor positioning). You now give PRINT@ the Y and X coordinates of the position you want to print! (Requires 64K)

(64K Cass) $24.95 *(64K Disk) $27.95*

3-D DRAWING BOARD

This is a tool for education, entertainment, or serious projects. It helps you draw objects in 3 dimensions and then rotate, change elevation, size, and distance. The drawings can be saved to tape or disk for future use. A complete instruction manual makes operation easy. (Requires Extended BASIC & 16K for cassette or 32K for disk.)

(16K Cass) $24.95
(32K Disk) $27.95



SEMI DRAW

Drawing pictures is fun and easy with SEMI DRAW! Your computer's keyboard or joystick draws in eight colors with semi alpha grapics 8, 12, or 24. It provides animation capabilities and will dump the picture to a Line Printer VII, Line Printer VII, NEC 8023A, or C Itoh 8510 printer. Just press the space bar to see the HELP display for instructions! Requires 32K with Extended BASIC and makes drawing fun for anyone.

(32K Cass) $21.95
(32K Disk) $24.95

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(619) 436-3512

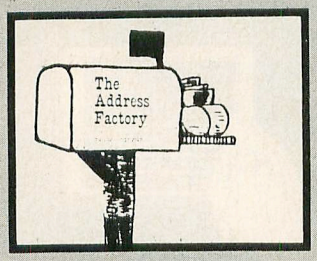
HOME AND WORK

VERSAMAIL™

VersaMail is a sophisticated mailing list manager for the 64K Color Computer with at least 1 disk drive. Features include:

- Over 800 names may be saved on a single disk. More than 2500 names are possible with 4 drives. The program can put one file on as many as 4 disks which save you from moving the disks around.
- 8 pre-defined address fields. Up to 12 user definable fields.
- Logical selection on any field for labels or screen display.
- User definable label format (1 to 2 across). Extra wide or extra long labels are supported.
- MailMerge feature inserts mailing list data into a form letter and prints it automatically for a very professional looking direct mailing.

(64K Disk) $39.95



ADDRESS FACTORY

Perfect for club newsletters, church mailings and business customer lists, it records Name, Address, City-State, Zip, and a special code of 27 characters for each person. You can add, delete, or change information easily. The program prints mailing labels or a listing of all or any selected subset of your names. It sorts the names by zip code or special code. 255 names can be stored with disk, 125 with 32K cassette, or 55 with 16K cassette. (Requires 16K & a printer.)

(16K Cass) $17.95
(32K Disk) $22.95

VIDEO PLUS

composite video monitor interface
the industry standard

Connect the Color Computer to any composite video monitor and see a crisp, clear picture with no RF interference! The Video Plus comes with everything you need. It is fully assembled and tested, making it easy to install with NO SOLDERING! There is no need to disable your TV interface. The Video Plus works with any motherboard version. Its easy adjustment optimizes the video signal exactly for your monitor and computer. *$24.95*

VIDEO PLUS II M

This easy-to-install composite video interface connects the new CoCo II with an NTSC standard *monochrome* (amber or green screen) *composite video monitor*. No soldering is required. And it does *not* disable your regular TV output!

$26.95

HOME MONEY MANAGER

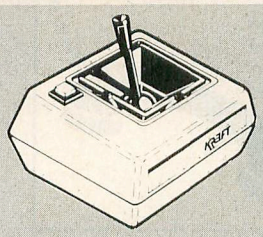
Now you can tell in a nutshell how much money you spent and on what and where your income came from. Just record all of your checkbook activities — each deposit, check, and bank charge. Assign each to any of your account codes and the computer can summarize all of your expenses, income, and cash flow. (Records up to 480 transactions.) Yes, it helps balance the checkbook, but also provides such reports as: Summary of Expenses, Summary of Income Sources, list of all checkbook transactions. These make tax time a snap! The disk version includes a program to convert a cassette HMM file to disk and the number of checks is limited only to the available disk storage! (Requires 32K & a printer.)

(32K Cass) $19.95
(32K Disk) $29.95

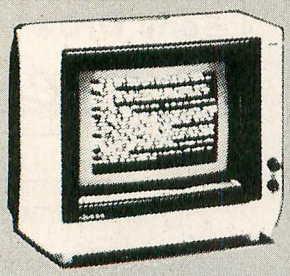
ACCESSORIES

KRAFT JOYSTICK

$37.95



high performance with linear pots & switch selection between self-centering or free-floating



MONITORS

Buy your monitor from Computerware and you get your Video Plus for only $19.95!!

(Monitor and Video Plus must be purchased together)

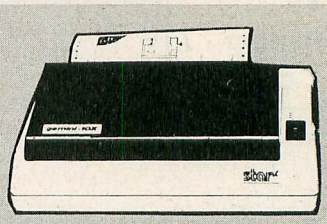
Gorilla green screen	$104.95
Gorilla amber screen	$124.95
BMC color	$295.00

64K RAM SET

Now including instructions for the CoCo III!

(requires rev. E or higher motherboard)

$69.95



PRINTERS

Gemini 10x w/interface	$419.95
C.Itoh 8510 w/interface and Gdump program	$459.00
Botek interface (parallel to serial interface)	$64.95

VIDEO CLEAR for TV output — $14.95

(eliminates RF interference)

WICO joystick adapter — $18.95

(interface Atari type joysticks to the Color Computer)

DISKETTES — Nashua brand — double-density

Pkg of 5	$14.95
Box of 10	$26.95

BOOKS

- ★ **Your Color Computer** by Doug Mosher — excellent ideas, hints, & reviews — $12.95
- ★ **Color Computer Memory Map** by B. Russell — $9.00
- ★ **Using Computer Information Services** — $12.95

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ACCESSORIES

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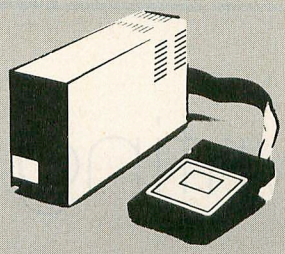

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- Simulated "CB"
- Special Interest Groups
- Electronic Banking & Shop-At-Home
- Games Galore!
- Electronic Mail and Nat'l Bulletin Board

The introductory Starter Kit for only $39.95 includes 5 FREE HOURS of connect time, a Personal ID number and password, a 3-ring binder, CIS User's Guide, telephone list with log-on instructions, and an introductory subscription for TODAY!

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for more reliability & gold connectors!

with JDOS	$135.00
supports double-sided drives and 40 tracks with RSDOS	$155.00

BUMPER STICKERS!!
$1.00 each

PROGRAMMERS DO IT A BYTE AT A TIME

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SIGNATURE _____

*SHIPPING: Under $100 — add $2 surface, $5 air/Canada
Over $100 — add 2% surface, 5% air/surface Canada

Calif. Residents add 6% sales tax

Eight Steps To Writing Solid Software Documentation

By Robert Tyson, Ph.D.

There are three reasons for writing software documentation: (1) so the user can use it, (2) so the user can modify it to his needs and use it, and (3) so the author can debug it or figure out what he wrote months (or years) later. Sooner or later, if you own a computer you will write your own program. You may want to use it, sell it, or just modify or expand it. In any case, you need documentation. The simplest form of documentation is usually a descriptive title, but that is useless for the first reason and inadequate for the second and third. Heavily commented programs (with many REMarks) can usually satisfy reason 3 since the hardware configuration is not often changed, but this requires a lot of memory for the remarks and may still be gibberish six months after the logic flow is forgotten.

To avoid this trauma amd make your software useful or marketable, a few guidelines may help. Since the Color Computer popularity has flourished, software is coming out of the woodwork, which makes us all very happy. On the other hand, if the software is good (no matter how good) but we can't use it, it is worth no more than the magnetic domains where it's encoded. From experience as a software user and software author I've compiled (no pun intended) eight steps for generating software documentation. Normally, if you document these items in order, you will have produced an acceptable document for your work. This may seem like common sense, but just page through the manual for the latest utility program you bought or wrote. If it doesn't cover the first seven points, it is missing something.

(Robert Tyson holds a doctorate in physics and designs and analyzes high energy laser beam control systems using computer simulations. He and his family live in Jupiter, Fla.)

Guidelines For Documenting Software

1) What is the purpose for it?
Why does it exist, what does it do? Does it speed up file sorting, or does it provide entertainment?

2) In general, how does it work?
No details, but is it a printer utility that uses dot-addressable graphics or is it a real-time Adventure game where you respond interactively?

3) What are the hardware and operating system requirents?
Does it use 16K non-Extended BASIC, a CoCo, and a tape, or is it a 64K FLEX program with a printer and modem optional?

4) What are the input and output formats and ranges?
Does it require one or two word commands with eight letters maximum? Does it allow floating point numerical entry with only graphics output? Or, is it menu driven?

5) How do you make it run and what are your options?
Must you *POKE25,6:NEW* before loading or just insert the disk and type RUN "A"? What can you do if you get an overflow error; can you recover the data?

6) What is the runtime?
Does the game take four hours to play? Does it take 20 seconds to check memory and then load prior to seeing action on the screen?

7) What is the accuracy?
Does it numerically calculate to 10 decimal places or is integer arithmetic used? Will the joystick display "dead" zones?

8) What are the detailed functions and algorithms used?
Do not include this if it is copy protected or just for user operation.
Does it calculate the arcsin(x) by a series of 30 terms? Does it overlay memory onto the memory area for screen display and rapidly shift graphics pages for the flashing display? Which RAM hooks does it use?

Commercial software documentation often includes only the first five points. Authors may argue that runtime and accuracy are irrelevant for graphics games, etc., and they may be right, but why not tell the user that "the photon torpedo responds slowly to the fire button and you must lead the target."

Listing 1 is a short program to key into your computer. The following is an example of documentation which covers the points I've addressed and could be used as a model for your own documentation.

The listing:

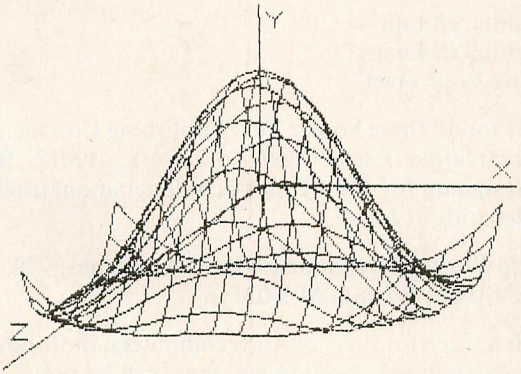
```
10 CLS:FLAG=1
20 PRINT@258,"FACTORIAL CALCULAT
ION"
30 INPUT"NUMBER TO BE CALCULATED
";X
40 X=INT(X):IF X<0 THEN 130 ELSE
 IF X>33 THEN 140 ELSE IF X=0 TH
EN 50 ELSE 60
50 X=1:FLAG=0
60 FACT=1
70 FOR K=1 TO X
80 FACT=FACT*K
90 NEXT K
100 IF FLAG=0 THEN X=0
110 PRINT X;"!=";FACT
120 FLAG=1:GOTO 30
130 PRINT"FACTORIALS OF NEGATIVE
 NUMBERS  DO NOT EXIST":GOTO 30
140 PRINT"ENTRY IS TOO LARGE, IT
 WILL      OVERFLOW":GOTO 30
```

This program calculates the factorial of a number. It can be used as a stand-alone program or as a subroutine in another BASIC program. The program accepts input from the keyboard and outputs to the screen only. A Color Computer, 4K non-Extended BASIC, is all that is required.

Factorials exist only for zero or positive integer numbers. The program accepts inputs between 0 and 33. Error messages will occur otherwise. The integer part of a positive non-integer input is used. After keying in the program, type *RUN*. The computer will prompt you for input or errors. For all values the factorial will appear "instantaneously."

Color Computer display capability is nine significant digits; all results were checked against tables and verified to be accurate to eight significant digits. The program uses lines 10-30 to input the data and line 40 for checking the validity of the input value. Since 0!=1!=1, a flag is set in line 50. Lines 60-90 do a brute force calculation of the formula x!=(1)(2)(3) . . . (x). Lines 100-120 check for the zero flag, output the results and loop to the beginning. Press [Break] to terminate the program.

YOUR COLOR COMPUTER JUST EARNED A MATH DEGREE!



MATHMENU

Developed by an engineer, *Mathmenu* is a powerful menu-driven system to turn your Color Computer into an intelligent, flexible tool for mathematics and engineering. *Mathmenu* takes the tedium out of math, leaving your full brain power to attack the "meat" of your problems. By rapidly manipulating matrices and vectors, performing integration and differentiation, solving quadratic equations, plotting user defined functions and much more, *Mathmenu* can help simplify the most complex problems. Whether you are a student or a professional, if you use math, you need *Mathmenu.*

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Complete documentation of all functions is included.

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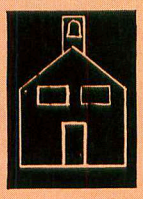
A Joyful Family Experience

By Fran Saito
and
Bob Albrecht



A wise dragon once said, "School is everywhere and learning is something you can learn to do."

—Laran Stardrake

Hello, and Welcome

A long time ago, in a galaxy nearby, the home was the center of learning. Parents and children worked together to pass on knowledge to daughter and son. What was not learned at home was commonly learned by becoming an apprentice who learned from a master. There were few "schools," institutions devoted to teaching instead of learning.

Time passed and schools flourished. In the USA today, schools are becoming increasingly less adaptive to a changing world. Fortunately, something is happening, something that provides rich and highly motivating environments for learning, outside of schools. Millions of people are buying computers for home and personal use. Within a few years nearly everyone will have a computer. There exists an unprecedented opportunity for learners to take control of the means of learning.

As learning moves out of the school into the direct control of learners, once again people are enjoying learning as an adventure. For themselves, their families, their friends and neighbors. Through the use of a home computer, the entire family can work and play together to learn anything from the mundane to the most esoteric subjects, and on a schedule and at a pace chosen by the learners.

"School Is In The Heart of a Child" is for parents of quite young children. We want to help you work and play with your three- to eight-year-old child and learn to use computers as a joyful family experience. We want to suggest ways to incorporate the home computer as another means to encourage your child's independence, growth and control over his own life; see the pride on her face as she directs the computer to do what she with deliberation selects; see her head gears switch to "on" as she progresses step-by-step with your presence and caring direction.

We will explore (we hope, with *your* help) the following:

- Specific "teaching" techniques so that the discovery can be the child's own.
- Critical evaluation of software based on extensive play-testing in family and related environments.
- Additional resources to consult: books, magazines, software publishers, networks, etc.
- Suggestions for interludes and fun times away from the computer (a must!): call the librarian for specific information; watch a TV program together and discuss it; work together as volunteers in a community project; take a fall (or spring or winter or summer) awareness walk. . . .
- Whatever we learn from families we work with in Menlo Park or from you, our readers, let's pool our knowledge. Let's share our experiences as we all learn from our children.

In addition, we will provide many small programs (beginning this issue!) you can type in and use right now, and information on how to enter and use programs stored on tape cassettes or diskettes.

Things To Read

One of the best sources of general information on teaching your on children are books by John Holt. We recommend the following titles:

"How Children Fail"
"How Children Learn"
"Teaching Your Own"

Publisher for all three books: Dell Publishing Co., Inc., 1 Dag Hammarskjold Plaza, New York, N.Y., 10017. We suggest you sign up for John Holt's newsletter about teaching your own kids at home.

"Growing Without Schooling," Holt Associates, 729 Boylston Street, Boston, MA 02116.

Although written for users of Atari computers, the following book has much information we think will be useful to you.

Lower, Judy, Ed Neil, and Tim Finger. "Buy a School for Your Home," Reston Publishing Company, 11400 Sunset Hills Road, Reston, VA 22090.

Because you own a CoCo, you subscribe to *the Rainbow*, a magazine devoted entirely to *your* computer. We recommend a second magazine, which specializes in . . . well, the name of the magazine tells you.

"Family Computing," Scholastic, 730 Broadway, New York, N.Y., 10003, $17.97 per year (12 issues).

If you have a pre-school child, try to get this back issue: Volume 1, Number 3, November, 183. It focuses on computing for very young children. Fascinating stuff.

(Fran Saito holds a degree in education from the University of Hawaii and has taught preschool and elementary students. She feels her inspiration comes from Mariko, her five-year-old daughter, as she has watched her child's curiosity and desire to learn. Fran also speaks fluent Dutch and Japanese.)

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Kids Can Teach Computers

The CoCo is a great machine for teaching kids how to use, program, and enjoy computers. In this section of "School Is In The Heart of a Child," we suggest ways in which you and your children can learn together how to tell the CoCo to do what you want it to do.

So, grab a kid and help her or him enjoy — and learn to understand — simple commands and short programs in Color BASIC. We suggest things to do. *You* explain what is happening, answer questions, modify our ideas, and enrich the learning experience with *your* ideas. But don't do the typing. Let the kids do the hands-on stuff. Be patient — let them make mistakes, correct their own mistakes and, especially, encourage them to experiment!

EXPERIMENT!

Help kids learn to read and understand BASIC. Presto! Many of them will them *teach themselves* how to express themselves creatively in BASIC, as if by

MAGIC!

Some people are not interested in writing original programs. That's okay. They can still *use* and *enjoy* computers, thanks to programs written by people who like to write them.

Perhaps this is part of "computer literacy." After all, more people read novels than write novels; more people listen to music than compose music; more people use inventions than invent inventions; more people appreciate art than create art.

Begin

Show your eager young learner how to hook up the Color Computer to a color TV. We assume you know how to do this, including setting the TV channel to 3 or 4. Turn on the Color Computer and the color TV. This is what you might see:

```
COLOR BASIC 1.0
© 1980 TANDY
OK
■
```

This is the CURSOR →

You see black letters on a green screen

If your screen says Color BASIC 1.2 or Color BASIC 2.3, that's okay. You have your later versions of BASIC than the one we are using. If your CoCo has Extended Color BASIC, you will see an appropriate message on the screen.

Tell them about the *prompt* (OK) and the cursor (■). The cursor continually changes color as it blinks on the screen. When you see the blinking cursor, it is your turn to do something.

Type [C][L][S] and press the [ENTER] key. This is what you see:

```
OK
■
```

The prompt →
The cursor →

blink, blink, blink . . . *on a green screen*

Have someone type a name and press the [ENTER] key. This is what happened when Mariko typed her name and pressed the [ENTER] key.

The KEY-264K is here!!

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For DISK users, the KEY-264K allows you to alternate between DISK and EXTENDED BASIC on the same side with simple keystrokes. No need to pull your controller or power down. You can be in EXTENDED BASIC on one side and in DISK BASIC on the other side and still switch back and forth and have full communications between the two sides.

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The KEY-264K works on 32K systems with "E", "F", or even modified "D" boards and requires EXTENDED or DISK BASIC with GOOD 64K MEMORY CHIPS! Systems with piggy-back 32K or half-good 64K memory chips WILL NOT WORK!!

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WORKS WITH THE NEW 64K COLOR COMPUTER TOO!!

oops!

```
OK
MARIKO
?SN ERROR
OK
■
```

Oops! The CoCo typed an error message (?SN ERROR). Explain that "The CoCo doesn't understand you." That's okay. Don't worry about occasional misunderstandings. They, and you, will quickly learn how to make the computer understand.

> YOU CAN DO NOTHING WRONG.
> MISTAKES ARE OK, PART OF LEARNING.
> *EXPERIMENT, TRY AGAIN, HAVE FUN.*

Even very young kids can tell the computer to change screen colors.

Find the [CLEAR] key. Press it.

The screen is clear except for the cursor

```
■
```

Two ways to clear the screen to mostly green:

Type *CLS* and press the [ENTER] key.

Press the [CLEAR] key.

Tired of a green screen? Try some other colors.
Type *CLS 8* and press the [ENTER] key.

Orange screen except for the top line, which is green

```
OK
■
```

The actual colors will depend on your TV. Adjust the color controls until you get an orange screen with a green top line. More colors? Try these:

TYPE THIS	GET THIS
CLS 0	black screen
CLS 1	green screen
CLS 2	yellow screen
CLS 3	blue screen
CLS 4	red screen
CLS 5	buff screen
CLS 6	cyan screen
CLS 7	magenta screen
CLS 8	orange screen

Hmmm . . . what about *CLS 9*? Try it and find out.

EXPERIMENT!

The Sound of SOUND

Add some music.

Type *SOUND 89, 20* and press [ENTER]

Did you hear it? If not, turn up the volume on your TV. When you type *SOUND 89, 20* and press the [ENTER] key, the Color Computer plays a musical tone on the TV's sound system.

You type: *SOUND 147,20*
A different tone! What's different?

You type: *SOUND 89, 50*
How is this different from *SOUND 89, 20*?

You type: *SOUND 147,100*
How is this different from *SOUND 147, 20*?

Aha! The first number is the tone; different numbers give different tones. The second number is the length of the tone; bigger numbers give longer tones. This is also called the *duration* of the tone.

SOUND 89, 20
Play this tone for this long

SOUND 89, 20
tone **duration (length of tone)**

Try some sounds. Try a low, short tone *(SOUND 1,1)*. Try a high, long tone *(SOUND 210, 60)*. Try a scratchy tone *(SOUND 255, 20)*. What happens when you try these?

SOUND 0, 1 Tone number is 0.
SOUND 256,1 Tone number is 256.
SOUND 89, 0 Duration is 0.
SOUND 89, 256 Duration is 256.

Encourage everyone to discover that tone numbers can be 1 to 255, and duration numbers can be 1 to 255.

Combine color and sound.

Type *CLS 8: SOUND 89, 20* and press [ENTER]
Colon

You see an orange screen and hear a tone. More than one sound? Of course.

Type *SOUND 89, 10: SOUND 108, 10*
Colon

Three sounds? Four sounds? Experiment!

Every Kid A TV Star!

Enter this short program, then let every kid try it.

```
10 REM**NAME EVERYWHERE SCH1-1
20 CLS
30 INPUT "YOUR NAME"; N$
40 CLS
50 PRINT N$
70 GOTO 50
```

We'll add line 60 later.

RUN it. You will see:

```
YOUR NAME? ■
```

Ask someone to type his or her name and press [ENTER]. This is what happened when Mariko typed her name and pressed [ENTER].

MARIKOMARIKOMARIKOMARIKOMARIKOMA
RIKOMARIKOMARIKOMARKIOMARIKOMARI
KOMARIKO

and so on, everywhere on the screen

Oh, it boggles the eyes! Press the [BREAK] key to stop the computer. Then type *RUN* and press [ENTER] to put another name on screen.

- To stop the CoCo, press the red [BREAK] key.
- To run the program, type *RUN* and press the [ENTER] key.
- When the CoCo asks for YOUR NAME, type any name and press the [ENTER] key.

Show your child how to use quotation marks to include spaces before or after her or his name.

YOUR NAME? "MARIKO " ■ ← **cursor**

↑ **Put one space here**

Now press [ENTER], and you will see:

MARIKO MARIKO MARIKO MARIKO MARI
KO MARIKO MARIKO MARIKO MARIKO M
ARIKO

and so on. Also try more than one space after the name.

Of course, you don't have to enter names. Enter any bunch of characters you want. Try an arrow (→) or a snail with a trail (. . . @) or a shooting star (———*). EXPERIMENT! Let your fingers wander over the keyboard. Don't let computer comments such as ?EXTRA IGNORED spoil your fun. Some patterns fill the screen and then remain static, others fill the screen and then seem to move left, right, up, down — some even seem to vacillate (or is it oscillate?). Have you figured out why this happens?

Slow things down. Add a *time delay* to the program.

```
60 FOR KK=1 TO 5: NEXT KK
```

Now the program looks like this.

```
10 REM**NAME EVERYWHERE SCH1-2
20 CLS
30 INPUT "YOUR NAME"; N$
40 CLS
50 PRINT N$
60 FOR KK=1 TO 5: NEXT KK
70 GTO 50
```

Make the time delay (line 60) shorter or longer.

Shorter: 60 FOR KK=1 TO 2: NEXT KK
Longer: 60 FOR KK=1 TO 10: NEXT KK

Or, use *SOUND*. Replace line 60 by one of these.

Talk is Cheap!

You want your color computer to talk, but how much will it cost?
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Reviewed in the April issue of *Rainbow.*

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```
60 SOUND 89, 1                Monotonous sound.
      or
60 SOUND RND(255), 1          Chaotic sound.
```

Also try other numbers here. 5 or 10 or 20 or . . .

Here is a variation of our program.

```
10 REM**NAME EVERYWHERE SCH 1-3
20 CLS
30 INPUT "YOUR NAME"; N$
40 CLS
50 PRINT N$;
60 FOR KK=1 TO 5: NEXT KK
70 K$=INKEY$:IF K$=""THEN 50
80 GOTO 20
```

When this program is running, press any key (except [BREAK] or [SHIFT]) and the CoCo will start over from line 20.

Playtesting

ComputerKid, USA puts computers in the hands of kids in youth organizations, alternative schools, and at home in order to playtest and evaluate educational software in places that are learner-centered, instead of teacher-centered.

During 1983, ComputerKid organized, managed, and conducted playtesting and evaluations of more than 100 items of educational software for Atari computers. Results appear in the book "Buy a School for Your Home," mentioned earlier in this article.

Your authors will personally playtest CoCo software designed for three- to eight-year-old children and report our observations and opinions. We will also report on systematic playtesting by ComputerKid, USA.

We have received the following software to evaluate.

- *Early Games* from Counterpoint Software, Inc., Suite 218, 4005 West Sixty-fifth Street, Minneapolis, MN 55435. The cassette version runs on a 16K CoCo with Color BASIC. Extended BASIC is not required. We are especially interested in software that runs on the least expensive CoCo!
- Several educational games from The Learning Company. These are available from Follett Library Book Company, 4506 Northwest Highway, Crystal Lake, Ill., 60014. Toll free 1-800-435-6170. In Illinois: 1-815-455-1100.

  Juggle's Rainbow (ages 3 to 6)
  Bumble Games (ages 4 to 10)
  Moptown (ages 6 to 13)

These games are available on cassette for 16K CoCo with Extended Color BASIC or on diskette for 16K.

Amazing! All the above games run on a 16K CoCo with Extended BASIC and a cassette recorder — total cost about $300 at the time this was written. To run the same games on a Apple requires 48K and a disk drive. Cost? More than $1,000!

Help!

If your home has a kid, three to eight years old, and a CoCo, please share your experiences in using your CoCo with your offspring. Fran and Bob, P.O. Box 310, Menlo Park, CA 94026. If you want a reply, please enclose a self-addressed, stamped envelope.

TRS-80 COLOR BASIC *Beginners*
by BOB ALBRECHT
This entertaining self-instructional book is packed with games, experiments, scores of intriguing challenges, and activities related to fantasy role-playing games. The ideal introductory aid for kids, parents and teachers using the Color Computer.
John Wiley & Sons $9.95
605 Third Ave., New York, NY 10158

TRS-80 COLOR COMPUTER GRAPHICS *Intermediate*
by DON INMAN
Explore the creative and imaginative blending of computers and color. This exciting book will enable you to explore all the graphics capabilities of Extended Color BASIC.
Reston Publishing Company $14.95
11480 Sunset Hills Rd., Reston, VA 22090

ASSEMBLY LANGUAGE GRAPHICS *Advanced*
FOR THE TRS-80 COLOR COMPUTER
by DON INMAN and KURT INMAN
This book is specific to the TRS-80 Color Computer with applications using sound and graphics to illustrate how an assembler can be used to perform feats that would be quite difficult, if not impossible in the BASIC language.
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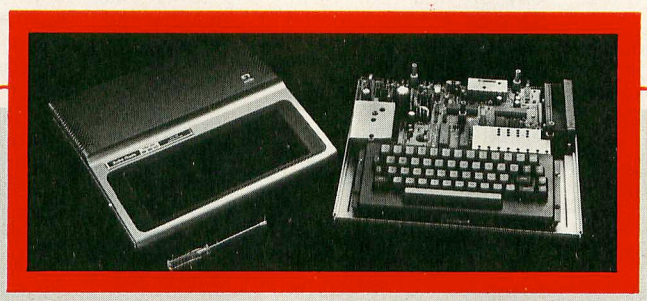
ORDERING INFO:

Suggested Retail Price: **$89.95,** includes plug adapter, part #500c, for models produced after Oct. '82 (Rev F and later). To order Model **KB-500** call Toll Free: **1-800-262-6006** for the retailer closest to you (7am-3pm Pacific Time). Warranty information may be obtained free of charge by writing to the address below.



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RAINBOWfest LONG BEACH

The fun and excitement of *RAINBOWfest* is coming your way . . . and now there will be a *RAINBOWfest* near you!

For the 1983-84 season, we've scheduled four *RAINBOWfests* in four parts of the country. Each one will offer fun, excitement, new products, seminars and information for your CoCo! And for those who (perish the thought) don't like CoCo as much as you, we've scheduled each *RAINBOWfest* in an area that will provide fun and enjoyment for the whole family.

Just look at this great lineup:

Long Beach, California — February 17-19. What a way to get away from the winter doldrums! And what better place than sunny Southern California with thousands of fellow CoCo owners! Fly with CoCo to the sun for the winter. Top flight seminars will draw on many local CoCo experts.

It's a holiday weekend, too — so take Monday off and tour Disneyland, Universal Studios, Marineland, the Queen Mary and Hollywood!

New Brunswick, New Jersey — March 30-April 1

RAINBOWfest comes to the populous northeast! It's a close drive from New York, Boston, Philadelphia,, Washington, Baltimore and Long Island.

Chicago — June 22—24. We'll play *RAINBOWfest* again, CoCo! This is the site of CoCo's *very first show* this spring. And right next to the world's largest indoor shopping mall.

Every show will be held at a Hyatt-Regency Hotel and all will be offering special rates for *RAINBOWfest*. Every show will open at 7—10 p.m. Friday, run 10 a.m.—6 p.m. Saturday and close with an 11 a.m.—4 p.m. session Sunday. Each will have a CoCo Community Breakfast featuring an outstanding national speaker from the Color Computer World. And each exhibition will be interspaced with a number of seminar sessions on all aspects of CoCo —from writing in machine language to making your BASIC work better.

But most of all, there will be exhibitors. Lots of them. All ready to demonstrate products of every kind. Some with special programs and hardware items to introduce. Others with show specials.

Tickets can be secured directly from *the Rainbow*. We'll also send you a special reservation form so you can get your special room rate.

Come to *RAINBOWfest* . . . help us all celebrate CoCo Community at its finest!

***RAINBOWfest*—Long Beach**
DATES: Feb. 17—19, 1984
HOTEL: Hyatt Regency, Long Beach
ROOMS: $59 per night single/double
KEYNOTE: Bob Albrecht

Advance Ticket Deadline: Feb. 13, 1984

***RAINBOWfest*—New Brunswick, N.J.**
DATES: March 30—April 1
HOTEL: Hyatt Regency New Brunswick
ROOMS: $59 per night single/double
KEYNOTE: To Be Announced

Advance Ticket Deadline: March 23, 1984

***RAINBOWfest*—Chicago**
DATES: June 22—24, 1984
HOTEL: Hyatt Regency Woodfield
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COMPANY _____

Orders sent less than two weeks prior to show opening will be held for you at the door.

VISA, MasterCharge, American Express accepted.

My Account # _____ Ex. Date: _____

Signature _____

RAINBOWfest Long Beach

Seminar Program And Speakers

Saturday 2/18/84 1:00 p.m. **Don Inman** — **Using And Teaching LOGO**

Don is one of the most respected names in the Color Computer field and an expert on graphic techniques in both BASIC and assembly language. His Using Graphics *column appears monthly in* the Rainbow.

Saturday 2/18/84 12:30 p.m. **Phil Kitchen** — **Radio Shack Software Support**

Manager of Software Support for Radio Shack, Phil will explain how the Tandy third party software support program works and answer questions about how Radio Shack can be of assistance to authors.

Sunday 2/19/84 12:00 p.m. **Paul Searby** — **Software Theft**

Martin Goodman and Bob Rosen

A panel discussion of one of the most important issues in the CoCo field with Mr. Searby of Computerware and Dr. Goodman of Cheshire Cat Software and Bob Rosen of Spectrum Projects.

Saturday 2/18/84 2:30 p.m. **Linda Nielsen** — **Women's Programs**

Linda, of Moreton Bay Laboratory, and several others active in the CoCo area, will lead a discussion on women's involvement in computing in general and the Color Computer in particular. Theme of the program: It's Not A Man's World.

For women and men who view computers mainly as an annoyance, a special seminar is planned on the general topic How To Live With A Computer At Home.

Sunday 2/19/84 2:00 p.m. **Bill Nolan** — **Fantasy Gaming And CoCo**

DungeonMaster, programmer and Rainbow *Columnist, Bill has developed a complete* Dungeons and Dragons *program for CoCo.*

Saturday 2/18/84 4:30 p.m. **The Dragons of Menlo Park** — **Open Forum**

Members of the Dymax group—including Bob Albrecht, Don and Kurt Inman—and a host of others—will conduct a "laidback California" open discussion on software and book authorship.

Saturday 2/18/84 3:00 p.m. **Jim Reed** — **Writing For Rainbow**

Jim, Managing Editor of the Rainbow, *will talk about how you can submit programs and articles to magazines for fun and profit.*

CoCo Classroom

Sharpen your programming skills and learn about LOGO. *Introduce your computer illiterate friends to the wonderful world of CoCo. Classes will be conducted by trained Radio Shack instructors.*

AND: *A special session on assembly language programming . . . and more to be announced later.*

PLUS . . . RAINBOWfest's "CoCo Community" Breakfast featuring Bob Albrecht, Popular Author and *Rainbow* Columnist

Bob Albrecht and Don Inman will be available at Radio Shack's booth to sign copies of *Color* LOGO *Guide for Teachers* and *Color* LOGO *Guide for Parents*.

Additional seminars are planned as well. Admission to all seminars is at no charge. See registration form for admission prices to exhibit area and breakfast.

COME TO RAINBOWfest LONG BEACH — IN SUNNY SOUTHERN CALIFORNIA

Net Results

By Richard A. White

A Basketball Statistics Program For Your CoCo

Right now we are well into basketball season. Some of you certainly are playing, coaching or helping. Others have family members involved. Or perhaps you are a fan and supporter of the old Alma Mater. In any case, someone associated with your favorite teams sits down with calculator and typewriter after each game for the thankless task of working up the latest team statistics. Now you can bring CoCo to their rescue with these two statistics programs. They require a 32K Extended BASIC machine, but you can keep the files on tape or disk and can move files back and forth if you wish.

BSKBINIT is designed to generate the BASIC files and revise them to start a new season. *ENTRDATA* is used to enter box score data from each game, update the year-to-date and career records for each player, and print the updated statistics along with team and opponents totals. This report is fully formatted in condensed (16.7 characters per inch) type by a Radio Shack LP VIII printer or equivalent. The formatted report can also be routed to a disk as an ASCII file for transfer to an automatic typesetter. (The program was written for *the Rainbow's* sister publication SCORE**CARD** which reports on University of Louisville sports and whose typesetter is set up to read ASCII files from CoCo disks.)

Start by loading *BSKBINIT* and choosing 1 START NEW CAREER STATS FILE. First, you enter a player's name in the format "I. Name," that is, first initial, a period, a space and the last name. This is important since the alphabetical sort looks for the last name starting at the fourth position in a string. If you make a mistake, don't worry. You can correct any data entered with the EDIT/CORRECT EXISTING FILE routine. Also remember the total length of the name cannot exceed 13 characters — the periods are there when you enter a name to remind you of this.

After the name is in, the program asks for the career data for the player starting with "G" which stands for total number of games played. Hit the [ENTER] key here and the program assumes there are no games and no career data and goes to the name of the next player. When there is no career data, *ENTRDATA* maintains a career data file which is identical to the year-to-date file and only prints career data on the statistical report when it is different from year-to-date.

The program keeps the data on each player which is shown in the following list along with item number and abbreviation as used in the program or on the printed report.

1	G	Total Games Played
2	GS	Games Started
3	MIN	Minutes Played
4	FG	Field Goal
5	FGA	Field Goals Attempted
6	3PT GF3	Three-Point Field Goals
7	3PTFGA3	Three-Point Field Goals Attempted
8	FT	Free Throws
9	FTA	Free Throws Attempted
10	REB	Rebounds
11	ASST	Assists
12	PF	Personal Fouls
13	D	Disqualifications
14	STL	Steals
16	BLK	Blocked Shots
17	TOVR	Turnovers
18	DUNK	Dunk Shots

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS data base management program.)

You can add new players to an existing file at any time. The new player is put at the end of the list. I strongly recommend that once you have initialized a file that you sort it alphabetically and leave it that way for the rest of the season. The *ENTRDATA* program makes game data files which are stored according to the order of the player list at that time. Adding players to the bottom of the list won't upset the relationship of player to game data while an alphabetical sort with added players will. There is a SORT ON AVERAGE routine in *ENTRDATA* that lets you sort a file that has been saved so the report can be printed starting with the player with the highest average. Here again, the file sorted by average should not be saved since it cannot be related to back game data files.

Data entry is simple, as the category for data to be entered is the last one to appear on the screen. Simply key in the right number and press [ENTER]. If you press [ENTER] only, a zero is entered.

Once you have entered all your initial data into the career file, edited it as necessary and sorted it alphabetically, save it to tape or disk. It is now ready to use with *ENTRDATA* for game data entry. Now load and run *ENTRDATA*. When you choose 1 ENTER NEW GAME STATISTICS, you are asked LOAD FROM 1 TAPE OR 2 DISK. The program expects you to have the tape or disk with your latest file named CURRSTAT ready. If you use a disk, the newest version is always saved out over the old version unless you change disks. I suggest that you let this happen since past data is of little value and will exist in printed form. But, be sure to backup the disk after each game. A single "1" or "2" keystroke starts the loading.

Now you are asked to enter the game date in the format MM-DD-YY. This will be used as the game file name and the disk is fussy about what's in a name. An extra "/" or "." will bomb the program. I know, since I did it. Do just what the prompts say and stay out of trouble. Game data entry starts with display of the first player's name and a 3 MIN? followed by the cursor. If the player did not play, key [ENTER] and the program will fill out that entry with zeros and display the next name. When you enter a number, the program enters a 1 after 1 G and displays 2 START=1. This prompts you to enter a 1 if the player started the game or simply an [ENTER] if he did not. From here on, data is entered as you did when you made the initial file.

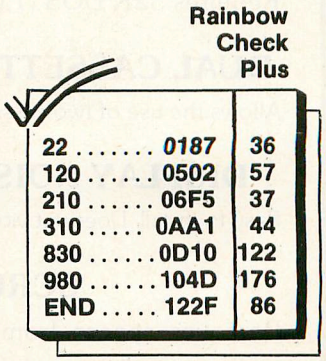
When data is entered for each player, the opponent's game stats are requested. These are the box score totals and not individual player data. This done, the program pauses to update all its career and year-to-date files. Team and dead-ball rebound data is now requested and SAVE TO 1TAPE OR 2 DISK appears. Don't worry about errors in the file. At this point we want to be sure to get the data that was entered safe. We can correct later and save an updated version. By the way, two saves of two files are always made to tape. CURRSTAT is saved first and then the game file is saved. If you want to preserve your game files, make sure to use new tapes each time or different sections of a tape. If you edit an old game file, be sure to do it with the latest CURRSTAT file in the machine. Disk drive owners can keep the current CURRSTAT file and a season full of game files on one disk without problems.

After data is saved, the program returns to the Main Menu. If there were mistakes, choose 2 EDIT/CORRECT CURRENT GAME and get the job done now. As the game file is edited, the career and year-to-date files are revised as well. Remember that *ENTRDATA* automatically makes a save of the latest files when it leaves any data entry or editing routine.

With all in order you are now ready to print the statistics. First, call 5 SORT ON AVERAGE. This puts the CURRSTAT file in memory in order by average. As a debugging aid, the order of the averages is printed each time a swap is made. If this bothers you, delete line 825. Next, choose 4 PRINT STATISTICS. The next menu you see was borrowed from another program and works differently. Use the up or down arrow keys to move the pointer to your choice then key [ENTER]. To change the Baud Rate, move the pointer to RESET BAUD RATE, key [ENTER] and enter your new BAUD RATE. The program accepts rates from 110 to 4800.

Using condensed type, the entire report prints on one 8½ x 11 page. For some applications like school newspapers and sports newsletters, you may find it suitable for publication directly. Printer codes used are for the LP VIII and succeeding Radio Shack nine-wire printers. If you need to change these, CHR$(27)CHR$(20) in line 625 sets the condensed type. CHR$(15) in line 636 starts underlining. CHR$(14) in line 640 stops the underlining. Underline printer codes also appear in line 682.

At season's end, pack your tapes or disks away until next year. To start off the new season, load last season's final results into *BSKBINIT* and choose 6 UPDATE TO START NEW SEASON. This routine lets you delete graduated players and zero's the year-to-date file. Add new players, do the annual alphabetical sort and save the file to the disk or tape for the new season. If you are on disk, put the *BSKBINIT* and *ENTRDATA* programs on the new disk and you are ready for the first tipoff.



Listing 1:

```
0 GOTO2010' BSKBINIT - A FILE  I
NITIALIZATION UTILITY          (
C) COPYRIGHT 1983   RICHARD A. W
HITE
1 I$=INKEY$:IFI$=""THEN1ELSEI=VA
L(I$):RETURN
11 PRINT@64,"";:PRINTUSINGFT$;"1
 G";:RETURN
12 PRINT@80,"";:PRINTUSINGFT$;"2
 GS";:RETURN
13 PRINTUSINGFT$;"3 MIN";:RETURN
14 PRINTUSINGFT$;"4 FG";:RETURN
15 PRINT@144,"";:PRINTUSINGFT$;"
5 FGA";:RETURN
16 PRINTUSINGFT$;"6 3PT FG";:RET
URN
```

MASTER DIRECTORY V2

Can you find that program you saved last month? Do you have many diskettes with multiple copies and need to organize your life? MASTER DIRECTORY V2 to the rescue! In only seconds add each diskette to MASTER DIRECTORY V2. Now ask MASTER DIRECTORY to find that lost program. Can't remember the filename? Ask for all the files that begin with the letter "C" or ask for all files with an extension of BAS.

What! Two files with the name CATS? Drats! Wait! The file on disk #5 was added on Oct. 5 and the file on disk #9 was added on Nov. 10. Hey fantastic!

Now let's get back to work. Let's see DIR. Hey! How did the filenames get in sequence? Yes, MASTER DIRECTORY V2 will sort the directory and remove the null directory entries. It also saves a copy of the allocator and the directory to protect against those nasty disk errors. Listing may be directed to the TV or the printer. Over 100 diskettes and 3000 filenames can be contained in one master directory.

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```
17 PRINT@176,"";:PRINTUSINGFT$;"
7 3PTFGA";:RETURN
18 PRINTUSINGFT$;"8 FT";:RETURN
19 PRINT@208,"";:PRINTUSINGFT$;"
9 FTA";:RETURN
20 PRINTUSINGFT$;"10 REB";:RETUR
N
21 PRINTUSINGFT$;"11 ASST";:RETU
RN
22 PRINTUSINGFT$;"12 PF";:RETURN
23 PRINT@304,"";:PRINTUSINGFT$;"
13 DISQ";:RETURN
24 PRINTUSINGFT$;"14 STEALS";:RE
TURN
25 PRINT@336,"";:PRINTUSINGFT$;"
15 BLOCKS";:RETURN
26 PRINTUSINGFT$;"16 TRNOVRS";:R
ETURN
27 PRINT@368,"";:PRINTUSINGFT$;"
17 DUNKS";:RETURN
30 GOSUB11:PRINTCR(PL,1):GOSUB12
:PRINTCR(PL,2):GOSUB13:PRINTCR(P
L,3):GOSUB14:PRINTCR(PL,4): GOSU
B15:PRINTCR(PL,5):GOSUB16:PRINTC
R(PL,6):GOSUB17:PRINTCR(PL,7)
31 GOSUB18:PRINTCR(PL,8):GOSUB19
:PRINTCR(PL,9):GOSUB20:PRINTCR(P
L,10):GOSUB21:PRINTCR(PL,11):GOS
UB22:PRINTCR(PL,12):GOSUB23:PRIN
TCR(PL,13)
32 GOSUB24:PRINTCR(PL,14):GOSUB2
5:PRINTCR(PL,15):GOSUB26:PRINTCR
(PL,16):GOSUB27:PRINTCR(PL,17):R
ETURN
35 PRINT:PRINT"PREPARE RECORDER
AND TAPE","PRESS ANY KEY WHEN RE
ADY":GOSUB1:PRINT:PRINT"WANT TO
RUN PAST LEADER? Y/N":GOSUB1:IFI
$="Y"THENMOTORON:FORK=1TO6000:NE
XT:MOTOROFF
36 RETURN
100 PL=1:CLS:PRINT:INPUT"TEAM NA
ME- 8 CHARACTERS MAX.    ";SC$:IF
LEN(SC$)>8THENSC$=LEFT$(SC$,8)
110 CLS:PRINT@6,"INITIALIZE PLAY
ERS":PRINT"PLAYER NAME  .....
.....":PRINT@45,"";:LINEINPUTNA$
(PL):IFLEN(NA$(PL))>13THENNA$(PL
)=LEFY$(NA$(PL),13):PRINT@45,NA$
(PL)
120 GOSUB11:INPUTCR(PL,1):GOSUB1
2:INPUTCR(PL,2):GOSUB13:INPUTCR(
PL,3):GOSUB14:INPUTCR(PL,4)
130 GOSUB15:INPUTCR(PL,5):GOSUB1
6:INPUTCR(PL,6):GOSUB17:INPUTCR(
PL,7)
140 GOSUB18:INPUTCR(PL,8):GOSUB1
9:INPUTCR(PL,9):GOSUB20:INPUTCR(
PL,10)
150 GOSUB21:INPUTCR(PL,11):GOSUB
```

```
22:INPUTCR(PL,12):GOSUB23:INPUTC
R(PL,13)
160 GOSUB24:INPUTCR(PL,14):GOSUB
25:INPUTCR(PL,15):GOSUB26:INPUTC
R(PL,16):GOSUB27:INPUTCR(PL,17)
180 PRINTCHR$(94)" FOR MENU
enter NEXT PLAYER";:GOSUB1:IFI$=
CHR$(94)THEN1000ELSEPL=PL+1:GOTO
110
200 CLS:PRINTTAB(8)"PLAYERS IN F
ILE":PA=32:FORX=1TO18:PRINT@PA,U
SING"##";X;:PRINT" "NA$(X);:PA=P
A+16:NEXT:PA=PA+32:PRINT@PA,"ENT
ER # OF PLAYER TO REVIEW/EDIT"CH
R$(94)" FOR MAIN MENU";:INPUTI$:
I=VAL(I$)
210 IFI$=CHR$(94)THEN1000ELSEIFI
<1ORI>18THEN200
220 PL=I:CLS:PRINT@6,"REVIEW CAR
EER STATS"::PRINT@32,NA$(PL)
230 GOSUB30:PRINT:PRINT"ENTRY #
TO CHANGE     "CHR$(94)" WHEN DON
EENTER 'N' FOR NAME";:INPUTI$:IF
I$=CHR$(94)THEN200ELSEI=VAL(I$):
IF(I<00RI>17)ANDI$<>"N"THEN220
240 PRINT@416,"":PRINT:IFI$="N"T
HENPRINT@416,"PLAYER NAME  .....
.....":PRINT@429,"";:LINEINPU
TNA$(PL):IFLEN(NA$(PL))>13THENNA
$(PL)=LEFY$(NA$(PL),13):PRINT@48
,NA$(PL):GOTO230ELSEPRINT@48,NA$
(PL):GOTO230
250 PRINT@416,"ENTER NEW VALUE F
OR ENTRY"I:INPUTCR(PL,I):GOTO230
300 CLS:PRINT@8,"caution caution
","THIS ROUTINE WILL ZERO OUT TH
E  CURRSTAT FILE EXCEPT FOR CARE
ER DATA. TO PRESERVE LAST YEAR'S
   RECORDS, MAKE A BACKUP DISK,
   PLACE LAST YEARS DISK ON FILE
   AND BEGIN THIS YEAR ON THE NE
W  DISK.":PRINT
302 PRINT:PRINT"DO YOU WANT TO Q
UIT THIS ROUTINENOW TO MAKE BACK
UP DISK? Y/N"
304 GOSUB1:IFI$="Y"THENENDELSEIF
I$<>"N"THEN304
305 CLS:PRINTTAB(8)"PLAYERS IN F
ILE":PA=32:FORX=1TO18:PRINT@PA,"
";:PRINTUSING"##";X;:PRINT" "NA$
(X);:PA=PA+16:NEXT:PA=PA+32:PRIN
T@PA,"ENTER # OF PLAYER TO DELET
E",CHR$(94)" CLEAR FILES &GOTO M
AIN MENU";:INPUTI$:I=VAL(I$)
310 K=I:IFI$=CHR$(94)THEN350ELSE
IFI<1ORI>18THEN300
315 PRINT@416,"":PRINT:PRINT@416
,"DELETING "NA$(I)
320 IFNA$(K+1)<>""THENK=K+1:GOTO
320
330 FORX=I TOK-1:NA$(X)=NA$(X+1)
:FORY=1TO18:CR(X,Y)=CR(X+1,Y):NE
XT:NEXT:NA$(K)="":FORY=1TO18:CR(
K,Y)=0:NEXT:GOTO300
350 FORK=1TO18:FORL=1TO18:CM(K,L
)=0:NEXT:OP(K)=0:NEXT:FORK=1TO5:
RB(K)=0:NEXT:GOTO1000
800 CLS:PRINT@162,"sorting":PL=1
:FORX=0TO18:FORY=0TO18:TM(X,Y)=0
:TR(X,Y)=0:NEXT:OD(X)=X:NEXT
810 L1=LEN(NA$(PL)):L2=LEN(NA$(P
L+1)):IFL2=0THENIFFL=1THENPL=1:F
L=0:GOTO810ELSE840
820 IFRIGHT$(NA$(PL),L1-3)>RIGHT
$(NA$(PL+1),L2-3)THEN830ELSEIFRI
GHT$(NA$(PL),L1-3)<RIGHT$(NA$(PL
+1),L2-3)THENPL=PL+1:GOTO810ELSE
IFLEFT$(NA$(PL),1)<LEFT$(NA$(PL+
1),1)THENPL=PL+1:GOTO810
830 FL=1:TP$=NA$(PL):NA$(PL)=NA$
(PL+1):NA$(PL+1)=TP$:TP=OD(PL):O
D(PL)=OD(PL+1):OD(PL+1)=TP:PL=PL
+1:GOTO810
840 FORX=0TO18:FORY=0TO18:TM(X,Y
)=CM(OD(X),Y):TR(X,Y)=CR(OD(X),Y
):NEXT:NEXT:FORX=0TO18:FORY=0TO1
8:CM(X,Y)=TM(X,Y):CR(X,Y)=TR(X,Y
):NEXT:NEXT:GOTO1000
900 CLS:PRINT:PRINT"SAVE TO 1 TA
PE OR 2 DISK":GOSUB1:IFI<1ORI>2T
HEN900
910 D=1:IFI=1THEND=-1:GOSUB35
920 OPEN"O",#D,"CURRSTAT":PRINT#
D,DC$:PRINT#D,SC$:FORK=0TO18:PRI
NT#D,NA$(K):FORL=0TO18:PRINT#D,C
R(K,L):PRINT#D,CM(K,L):NEXT:PRIN
T#D,OP(K):NEXT:FORK=1TO5:PRINT#D
,RB(K):NEXT:CLOSE
930 IFDT$<>""THENOPEN"O",#D,DT$:
PRINT#D,OP$:PRINT#D,DT$:FORK=1TO
18:FORL=1TO18:PRINT#D,GM(K,L):NE
XT:PRINT#D,OG(K):NEXT:FORK=1TO4:
PRINT#D,GR(K):NEXT:CLOSE
940 IFI=1THENI=0:MOTORON:FORK=1T
0600:NEXT:GOTO920ELSE1000
950 CLS:PRINT:PRINT"LOAD FROM 1
TAPE OR 2 DISK":GOSUB1:IFI<1ORI>
2THEN950
960 D=1:IFI=1THEND=-1
965 PRINT:PRINT"PREPARE DISK OR
TAPE","PRESS ANY KEY WHEN READY"
:GOSUB1
970 OPEN"I",#D,"CURRSTAT":INPUT#
D,DC$:INPUT#1,SC$:FORK=0TO18:INP
UT#D,NA$(K):FORL=0TO18:INPUT#D,C
R(K,L):INPUT#D,CM(K,L):NEXT:INPU
T#D,OP(K):NEXT:FORK=1TO5:INPUT#D
,RB(K):NEXT:CLOSE
980 IFDT$<>""THENOPEN"I",#D,DT$:
INPUT#D,OP$:INPUT#D,DT$:FORK=1TO
```

```
18:FORL=1TO18:INPUT#D,GM(K,L):NE
XT:INPUT#D,G(K):NEXT:FORK=1TO4:I
NPUT#D,GR(K):NEXT:CLOSE
1000 CLS:PRINT@10,"MAIN MENU":PR
INT:PRINT" 1 START NEW CAREER ST
ATS FILE":PRINT:PRINT" 2 ADD PLA
YERS TO EXISTING FILE":PRINT:PRI
NT" 3 EDIT/CORRECT EXISTING FILE
":PRINT:PRINT" 4 SAVE FILE":PRIN
T:PRINT" 5 LOAD FILE"
1002 PRINT:PRINT" 6 UPDATE TO ST
ART NEW YEAR":PRINT:PRINT" 7 ALP
HABETICAL SORT";
1010 GOSUB1:ONI GOTO100,1020,200
,900,950,300,800:GOTO1000
1020 PL=1
1030 IFNA$(PL)=""THEN110ELSEPL=P
L+1:GOTO1030
2010 CLEAR2000:DIMNA$(18),CR(18,
18),CM(18,18),GM(18,18),OG(18),O
P(18),GR(4),RB(5),OD(18),TM(18,1
8),TR(18,18):FT$="%       %":GOT
O1000
36970 PRINT:PRINT"FILE NAME IS '
INITSTAT'
```

Rainbow Check Plus

20	019F	81	640	10C9	143
110	04D2	95	654	1352	173
170	0777	86	666	1604	119
210	0A5E	137	684	188A	241
610	0DB5	226	696	1BAB	77
			704	1E26	30
			910	20F1	115
			980	2328	138
			END	24D6	69

Listing 2:

```
0 GOTO2010' ENTRDATA - GAME DATA
ENTRY AND PRINTING UTILITY
(C) COPYRIGHT 1983    RICHARD A.
WHITE
1 I$=INKEY$:IFI$=""THEN1ELSEI=VA
L(I$):RETURN
11 PRINT@64,"";:PRINTUSINGFT$;"1
 G";:RETURN
12 PRINT@80,"";:PRINTUSINGFT$;"2
 GS";:RETURN
13 PRINT@96,"";:PRINTUSINGFT$;"3
 MIN";:RETURN
14 PRINT@128,"";:PRINTUSINGFT$;"
4 FG";:RETURN
15 PRINT@144,"";:PRINTUSINGFT$;"
5 FGA";:RETURN
16 PRINTUSINGFT$;"6 3PT FG";:RET
URN
17 PRINT@176,"";:PRINTUSINGFT$;"
7 3PTFGA";:RETURN
18 PRINTUSINGFT$;"8 FT";:RETURN
19 PRINT@208,"";:PRINTUSINGFT$;"
9 FTA";:RETURN
20 PRINTUSINGFT$;"10 REB";:RETUR
N
21 PRINTUSINGFT$;"11 ASST";:RETU
RN
22 PRINTUSINGFT$;"12 PF";:RETURN
23 PRINT@304,"";:PRINTUSINGFT$;"
13 DISQ";:RETURN
24 PRINTUSINGFT$;"14 STEALS";:RE
TURN
25 PRINT@336,"";:PRINTUSINGFT$;"
15 BLOCKS";:RETURN
26 PRINTUSINGFT$;"16 TRNOVRS";:R
ETURN
27 PRINT@368,"";:PRINTUSINGFT$;"
17 DUNKS";:RETURN
30 GOSUB11:PRINTGM(PL,1):GOSUB12
:PRINTGM(PL,2):GOSUB13:PRINTGM(P
L,3):GOSUB14:PRINTGM(PL,4): GOSU
B15:PRINTGM(PL,5):GOSUB16:PRINTG
M(PL,6):GOSUB17:PRINTGM(PL,7)
31 GOSUB18:PRINTGM(PL,8):GOSUB19
:PRINTGM(PL,9):GOSUB20:PRINTGM(P
L,10):GOSUB21:PRINTGM(PL,11):GOS
UB22:PRINTGM(PL,12):GOSUB23:PRIN
TGM(PL,13)
32 GOSUB24:PRINTGM(PL,14):GOSUB2
5:PRINTGM(PL,15):GOSUB26:PRINTGM
(PL,16):GOSUB27:PRINTGM(PL,17):R
ETURN
35 PRINT:PRINT"PREPARE RECORDER
AND TAPE","PRESS ANY KEY WHEN RE
```


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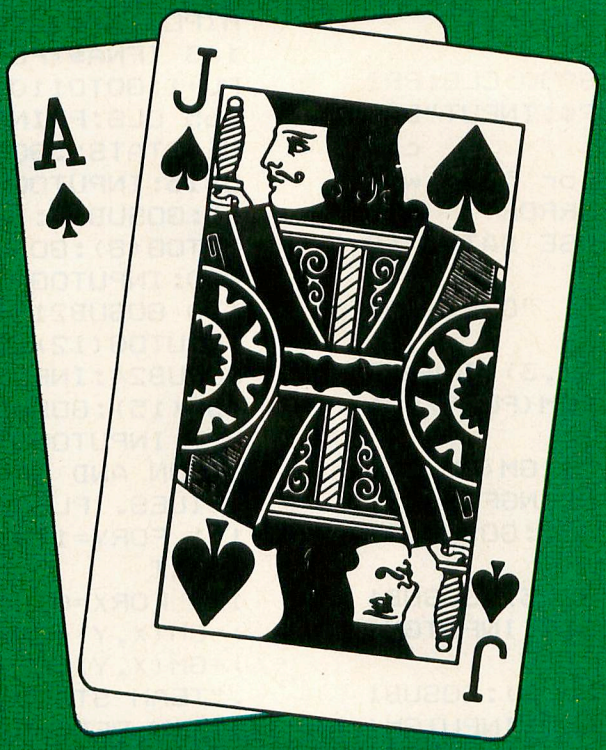

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```
ADY":GOSUB1:PRINT:PRINT"WANT TO
RUN PAST LEADER? Y/N":GOSUB1:IFI
$="Y"THENMOTORON:FORK=1TO6000:NE
XT:MOTOROFF
36 RETURN
100 PL=1:DT$="":GOSUB950:CLS:PRI
NT:INPUT"OPPONENT";OP$:INPUT"DAT
E AS MM-DD-YY.                cau
tion- do not use '/' or '.'  whi
ch will cause an FN ERROR     AND
 MAY CAUSE YOU TO LOOSE DATA.";D
T$
110 CLS:PRINT@3,DT$"    "OP$,NA$(
PL)
120 GOSUB13:INPUTGM(PL,3):IFGM(P
L,3)=0THENFORY=1TO18:GM(PL,Y)=0:
NEXT:GOTO163
125 GOSUB11:PRINT"   "1:GM(PL,1)=
1:PRINT@80,"";:PRINTUSINGFT$;"2
START=1";:INPUTGM(PL,2):GOSUB14:
INPUTGM(PL,4)
130 GOSUB15:INPUTGM(PL,5):GOSUB1
6:INPUTGM(PL,6):GOSUB17:INPUTGM(
PL,7)
140 GOSUB18:INPUTGM(PL,8):GOSUB1
9:INPUTGM(PL,9):GOSUB20:INPUTGM(
PL,10)
150 GOSUB21:INPUTGM(PL,11):GOSUB
22:INPUTGM(PL,12):GOSUB23:INPUTG
M(PL,13)
160 GOSUB24:INPUTGM(PL,14):GOSUB
25:INPUTGM(PL,15):GOSUB26:INPUTG
M(PL,16):GOSUB27:INPUTGM(PL,17)
163 IFNA$(PL+1)=""THEN165ELSEPL=
PL+1:GOTO110
165 CLS:PRINT"ENTER OPPONENTS GA
ME STATS":GOSUB14:INPUTOG(4):GOS
UB15:INPUTOG(5):GOSUB16:INPUTOG(
6):GOSUB17:INPUTOG(7):GOSUB18:IN
PUTOG(8):GOSUB19:INPUTOG(9):GOSU
B20:INPUTOG(10)
170 GOSUB21:INPUTOG(11):GOSUB22:
INPUTOG(12):GOSUB23:INPUTOG(13):
GOSUB24:INPUTOG(14):GOSUB25:INPU
TOG(15):GOSUB26:INPUTOG(16):GOSU
B27:INPUTOG(17):PRINT"UPDATING S
EASON AND CAREER      STATISTICS
 FILES. PLEASE WAIT.";
171 FORY=1TO17:OP(Y)=OP(Y)+OG(Y)
:NEXT
172 FORX=0TO18:FORY=0TO18:CM(X,Y
)=CM(X,Y)+GM(X,Y):CR(X,Y)=CR(X,Y
)+GM(X,Y):NEXT:NEXT:CLS:PRINT@11
,"TEAM STATS":PRINT:INPUT"U OF L
 TEAM REBOUNDS";GR(1):INPUT"U OF
 L DEADBALL REBOUNDS";GR(2)
175 FORY=1TO17:TO=0:FORX=1TO18:T
O=TO+CM(X,Y):NEXT:CM(0,Y)=TO:NEX
```

```
T
190 INPUT"OPPONENT TEAM REBOUNDS
";GR(3):INPUT"OPPONENT DEADBALL
REBOUNDS";GR(4):FORX=1TO4:RB(X)=
RB(X)+GR(X):NEXT:RB(5)=RB(5)+1:D
C$=DT$
195 FORPL=1TO18:CM(PL,18)=(CM(PL
,4)*2+CM(PL,6)*3+CM(PL,8))/RB(5)
:NEXT:GOSUB900:GOTO1000
200 CLS:DT$="":PRINT:PRINT:INPUT
"GAME DATE AS MM-DD-YY.
 caution- do not use '/' or '.'
 which will cause an FN ERROR.
 ";DT$:GOSUB950
210 CLS:PRINTTAB(8)"PLAYERS IN F
ILE":PA=32:FORX=1TO18:PRINT@PA,U
SING"##";X;:PRINT" "NA$(X);:PA=P
A+16:NEXT:PA=PA+32:PRINT@PA,"ENT
ER # OF PLAYER TO REVIEW/EDIT"CH
R$(94)" FOR MAIN MENU";:INPUTI$:
I=VAL(I$)
215 IFI$=CHR$(94)THENGOSUB900:GO
TO1000ELSEIFI<1ORI>18THEN210
220 PL=I:CLS:PRINT@8,"REVIEW PLA
YERS":PRINT@48,NA$(PL)
230 GOSUB30:PRINT:PRINT"ENTRY #
TO CHANGE     "CHR$(94)" WHEN DON
E";:INPUTI$:IFI$=CHR$(94)THEN210
ELSEI=VAL(I$):IF(I<00RI>17)THEN2
20
240 CM(PL,I)=CM(PL,I)-GM(PL,I):C
R(PL,I)=CR(PL,I)-GM(PL,I):CM(0,I
)=CM(0,I)-GM(PL,I):CR(0,I)=CR(0,
I)-GM(PL,I)
245 PRINT@416,"":PRINT:PRINT@416
,"ENTER NEW VALUE FOR ENTRY"I:IN
PUTGM(PL,I):CM(PL,I)=CM(PL,I)+GM
(PL,I):CR(PL,I)=CR(PL,I)+GM(PL,I
):CM(0,I)=CM(0,I)+GM(PL,I):CR(0,
I)=CR(0,I)+GM(PL,I):GOTO230
250 PRINT@416,"ENTER NEW VALUE F
OR ENTRY"I:INPUTCR(PL,I):GOTO230
600 'TARGET LINE
605 BP=PEEK(150):BU=INSTR(1,"618
41  87       180",RIGHT$(STR$(BP)
,LEN(STR$(BP))-1)):BU=4800/BU
610 CLS:PRINT@73,"PRINT ROUTINES
",,,"    CURRENT BAUD RATE ="BU,
TAB(6)"RESET BAUD RATE",,,"    P
RINT STATS TO PRINTER",,,"    PR
INT STATS TO DISK",,,"    MAIN M
ENU",,,,"USE UP/DOWN ARROWS TO M
OVE      POINTER TO SELECTION A
ND PRESS   enter.";
611 CT=1
615 CT$=RIGHT$(STR$(CT),1):LP=IN
STR(1,"    1 2 3 4",CT$):LP=LP*3
2+2:PRINT@LP,">";:GOSUB1:PRINT@L
P," ";:IFI$=CHR$(10)ANDCT<4THENC
T=CTT+1:GOTO615ELSEIFI$=CHR$(94)
ANDCT>1THENCT=CT-1:GOTO615ELSEIF
I$<>CHR$(13)THEN615ELSEONCT GOTO
620,630,632,1000
620 PRINT" ";:INPUT"ENTER NEW BA
UD RATE";BU$:BU$=LEFT$(BU$,1):BL
=INSTR(1,"36124",BU$):IFBL=0THEN
PRINT"baud rate error":SOUND100,
50:GOTO605
625 BU(1)=180:BU(2)=87:BU(3)=41:
BU(4)=18:BU(5)=6:BU=BU(BL):POKE1
50,BU:GOTO605
630 D=-2:GOTO635
632 D=1:OPEN"O",#1,"TYPESET"
635 CLS:IFD=-2THENPRINT#-2,"":PR
INT#-2,CHR$(27)CHR$(20)"Current
"DC$TAB(50)SC$" Basketball Stati
stics"ELSEPRINT#1,"Current "DC$:
PRINT#1,SC$" Basketball Statisti
cs"
636 IFD=-2THENPRINT#-2,CHR$(15)
638 N4$="####":N3$="###":NP$="#.
###":NA$="%                %"
640 PL=1:PRINT#D,STRING$(15,32)"
  G-GS     MIN-AVG     FG-FGA     P
CT    FT-FTA     PCT    REB-AVG  AS
ST-AVG     PF-D  STL  BLK  TOVR
DUNK    TP - AVG":IFD=-2THENPRINT
#-2,CHR$(14)
642 IFNA$(PL)=""THEN682
644 PRINT#D,"":PRINT#D,USINGNA$;
NA$(PL);:PRINT#D,USING"###";CM(P
L,1);:PRINT#D,"-";:PRINT#D,USING
N3$;CM(PL,2);:PRINT#D,"  ";:PRIN
T#D,USINGN4$;CM(PL,3);:PRINT#D,"
-";
646 IFCM(PL,1)>0THENPRINT#D,USIN
G"##.#";CM(PL,3)/CM(PL,1);ELSEPR
INT#D,USING"##.#";0;
648 PRINT#D,"  ";:PRINT#D,USINGN
3$;CM(PL,4);:PRINT#D,"-";:PRINT#
D,USINGN3$;CM(PL,5);:PRINT#D,"
";:IFCM(PL,5)>0THENPRINT#D,USING
NP$;CM(PL,4)/CM(PL,5);ELSEPRINT#
D,USINGNP$;0;
650 PRINT#D,"  ";:PRINT#D,USINGN
3$;CM(PL,8);:PRINT#D,"-";:PRINT#
D,USINGN3$;CM(PL,9);:PRINT#D,"
";:IFCM(PL,9)>0THENPRINT#D,USING
NP$;CM(PL,8)/CM(PL,9);ELSEPRINT#
D,USINGNP$;0;
652 PRINT#D,"  ";:PRINT#D,USINGN
4$;CM(PL,10);:PRINT#D,"-";:IFCM(
PL,1)>0THENPRINT#D,USING"#.#";CM
(PL,10)/CM(PL,1);ELSEPRINT#D,USI
NG"#.#";0;
654 PRINT#D,"  ";:PRINT#D,USINGN
4$;CM(PL,11);:PRINT#D,"-";:IFCM(
PL,1)>0THENPRINT#D,USING"#.#";CM
(PL,11)/CM(PL,1);ELSEPRINT#D,USI
NG"#.#";0;
```

```
656 PRINT#D,"   ";:PRINT#D,USINGN
4$;CM(PL,12);:PRINT#D,"-";:PRINT
#D,USING"#";CM(PL,13);:PRINT#D,"
  ";:PRINT#D,USINGN3$;CM(PL,14);
658 PRINT#D,"   ";:PRINT#D,USINGN
3$;CM(PL,15);:PRINT#D,"   ";:PRIN
T#D,USINGN3$;CM(PL,16);:PRINT#D,
"   ";:PRINT#D,USINGN3$;CM(PL,17)
;
659 PRINT#D,"    ";:TP=2*CM(PL,4)
+3*CM(PL,6)+CM(PL,8):PRINT#D,USI
NGN4$;TP;:PRINT#D," - ";:IFCM(PL
,1)>OTHENPRINT#D,USING"##.#";TP/
CM(PL,1)ELSEPRINT#D,USING"##.#";
0
660 IFCM(PL,1)=CR(PL,1)THENPL=PL
+1:GOTO642
662 PRINT#D,USINGNA$;"    Career"
;:PRINT#D,USING"###";CR(PL,1);:P
RINT#D,"-";:PRINT#D,USINGN3$;CR(
PL,2);:PRINT#D,"   ";:PRINT#D,USI
NGN4$;CR(PL,3);:PRINT#D,"-";:PRI
NT#D,USING"##.#";CR(PL,3)/CR(PL,
1);
664 PRINT#D,"   ";:PRINT#D,USINGN
3$;CR(PL,4);:PRINT#D,"-";:PRINT#
D,USINGN3$;CR(PL,5);:PRINT#D,"
";:PRINT#D,USINGNP$;CR(PL,4)/CR(
PL,5);
666 PRINT#D,"   ";:PRINT#D,USINGN
3$;CR(PL,8);:PRINT#D,"-";:PRINT#
D,USINGN3$;CR(PL,9);:PRINT#D,"
";:PRINT#D,USINGNP$;CR(PL,8)/CR(
PL,9);
668 PRINT#D,"   ";:PRINT#D,USINGN
4$;CR(PL,10);:PRINT#D,"-";:PRINT
#D,USING"#.#";CR(PL,10)/CR(PL,1)
;:PRINT#D,"   ";:PRINT#D,USINGN4$
;CR(PL,11);:PRINT#D,"-";:PRINT#D
,USING"#.#";CR(PL,11)/CR(PL,1);
669 PRINT#D,"   ";:PRINT#D,USINGN
4$;CR(PL,12);:PRINT#D,"-";:PRINT
#D,USING"#";CR(PL,13);:
671 PRINT#D,"   ";:PRINT#D,USINGN
3$;CR(PL,14);:PRINT#D,"   ";:PRIN
T#D,USINGN3$;CR(PL,15);:PRINT#D,
"   ";:PRINT#D,USINGN3$;CR(PL,16)
;:PRINT#D,"   ";:PRINT#D,USINGN3$
;CR(PL,17);
673 PRINT#D,"    ";:TP=2*CR(PL,4)
+3*CR(PL,6)+CR(PL,8):PRINT#D,USI
NGN4$;TP;:PRINT#D," - ";:PRINT#D
,USING"##.#";TP/CR(PL,1)
674 PL=PL+1:GOTO642
682 PRINT#D,USINGNA$;"";:PRINT#D
,CHR$(15)STRING$(111,32)CHR$(14)
:SD$=SC$+" TOTALS":PRINT#D,USING
NA$;SD$;:PRINT#D,STRING$(18,32);
684 PRINT#D,"   ";:PRINT#D,USINGN
3$;CM(0,4);:PRINT#D,"-";:PRINT#D
,USINGN3$;CM(0,5);:PRINT#D,"   ";
:PRINT#D,USINGNP$;CM(0,4)/CM(0,5
);ELSEPRINT#D,USINGNP$;0;
686 PRINT#D,"   ";:PRINT#D,USINGN
3$;CM(0,8);:PRINT#D,"-";:PRINT#D
,USINGN3$;CM(0,9);:PRINT#D,"   ";
:PRINT#D,USINGNP$;CM(0,8)/CM(0,9
);:PRINT#D,"   ";:PRINT#D,USINGN4
$;CM(0,10)+RB(1);:PRINT#D,"-";:P
RINT#D,USING"##.#";(CM(0,10)+RB(
1))/RB(5);
688 PRINT#D," ";:PRINT#D,USINGN4
$;CM(0,11);:PRINT#D,"-";:PRINT#D
,USING"##.#";CM(0,11)/RB(5);:PRI
NT#D," ";:PRINT#D,USINGN4$;CM(0,
12);:PRINT#D,"-";:PRINT#D,USING"
#";CM(0,13);:PRINT#D,"   ";:PRINT
#D,USINGN3$;CM(0,14);
690 PRINT#D,"   ";:PRINT#D,USINGN
3$;CM(0,15);:PRINT#D,"   ";:PRINT
#D,USINGN3$;CM(0,16);:PRINT#D,"
  ";:PRINT#D,USINGN3$;CM(0,17);:P
RINT#D,"    ";:TP=2*CM(0,4)+3*CM(
0,6)+CM(0,8):PRINT#D,USINGN4$;TP
;:PRINT#D," - ";:PRINT#D,USING"#
#.#";TP/RB(5)
692 PRINT#D,"":PRINT#D,"Opponent
's Totals"STRING$(16,32);
694 PRINT#D,"   ";:PRINT#D,USINGN
3$;OP(4);:PRINT#D,"-";:PRINT#D,U
SINGN3$;OP(5);:PRINT#D,"   ";:PRI
NT#D,USINGNP$;OP(4)/OP(5);ELSEPR
INT#D,USINGNP$;0;
696 PRINT#D,"   ";:PRINT#D,USINGN
3$;OP(8);:PRINT#D,"-";:PRINT#D,U
SINGN3$;OP(9);:PRINT#D,"   ";:PRI
NT#D,USINGNP$;OP(8)/OP(9);:PRINT
#D,"   ";:PRINT#D,USINGN4$;OP(10)
;:PRINT#D,"-";:PRINT#D,USING"##.
#";OP(10)/RB(5);
698 PRINT#D," ";:PRINT#D,USINGN4
$;OP(11);:PRINT#D,"-";:PRINT#D,U
SING"##.#";OP(11)/RB(1);:PRINT#D
," ";:PRINT#D,USINGN4$;OP(12);:P
RINT#D,"-";:PRINT#D,USING"#";OP(
13);:PRINT#D,"   ";:PRINT#D,USING
N3$;OP(14);
700 PRINT#D,"   ";:PRINT#D,USINGN
3$;OP(15);:PRINT#D,"   ";:PRINT#D
,USINGN3$;OP(16);:PRINT#D,"   ";:
PRINT#D,USINGN3$;OP(17);:PRINT#D
,"    ";:TP=2*OP(4)+3*OP(6)+OP(8)
:PRINT#D,USINGN4$;TP;:PRINT#D,"
- ";:PRINT#D,USING"##.#";TP/RB(5
)
702 PRINT#D,"":PRINT#D,SC$" TEAM
 REBOUNDS"TAB(30)RB(1)"-";:PRINT
#D,USING"#.#";RB(1)/RB(5);:PRINT
#D,TAB(50)"Opponent Team Rebound
s:"TAB(80)RB(2)"-";:PRINT#D,USIN
```

```
G"#.#";RB(2)/RB(5)
703 PRINT#D,SC$" DEADBALL REBOUN
DS"TAB(30)RB(3)"-";:PRINT#D,USIN
G"#.#";RB(3)/RB(5);:PRINT#D,TAB(
50)"Opponent Deadball Rebounds:"
TAB(80)RB(4)"-";:PRINT#D,USING"#
.#";RB(4)/RB(5)
704 PL=1:PRINT#D,"":PRINT#D,"3 P
oint FG-FGA: ";
706 IFNA$(PL)=""THEN720
708 IFCM(PL,7)>0THENPRINT#D,NA$(
PL)" (";:PRINT#D,USING"#";CM(PL,
6);:PRINT#D,"-";:PRINT#D,USINGN"
#";CM(PL,7);:PRINT#D,", ";:PL=PL
+1:GOTO706
720 PRINT#D,"":CLOSE:GOTO1000
800 CLS:PRINT@162,"sorting":PL=1
:FORX=0TO18:FORY=0TO18:TM(X,Y)=0
:TR(X,Y)=0:NEXT:OD(X)=X:NEXT:CT=
0
810 IFNA$(PL+1)=""THENIFFL=1THEN
PL=1:FL=0:CT=CT+1:PRINT@183,"PAS
S "CT:GOTO810ELSE840
820 IFCM(PL,18)=>CM(PL+1,18)THEN
PL=PL+1:GOTO810
825 FORX=1TO18:PRINTCM(X,18);:NE
XT
830 FL=1:TP$=NA$(PL):NA$(PL)=NA$
(PL+1):NA$(PL+1)=TP$:TP=OD(PL):O
D(PL)=OD(PL+1):OD(PL+1)=TP:TP=CM
(PL,18):CM(PL,18)=CM(PL+1,18):CM
(PL+1,18)=TP:PL=PL+1:GOTO810
840 FORX=0TO18:FORY=0TO17:TM(X,Y
)=CM(OD(X),Y):TR(X,Y)=CR(OD(X),Y
):NEXT:NEXT:FORX=0TO18:FORY=0TO1
7:CM(X,Y)=TM(X,Y):CR(X,Y)=TR(X,Y
):NEXT:NEXT:GOTO1000
900 CLS:PRINT:PRINT"SAVE TO 1 TA
PE OR 2 DISK":GOSUB1:IFI<1ORI>2T
HEN900
910 D=1:IFI=1THEND=-1:GOSUB35
920 OPEN"O",#D,"CURRSTAT":PRINT#
D,DC$:PRINT#D,SC$:FORK=0TO18:PRI
NT#D,NA$(K):FORL=0TO18:PRINT#D,C
R(K,L):PRINT#D,CM(K,L):NEXT:PRIN
T#D,OP(K):NEXT:FORK=1TO5:PRINT#D
,RB(K):NEXT:CLOSE
930 IFDT$<>""THENOPEN"O",#D,DT$:
PRINT#D,OP$:PRINT#D,DT$:FORK=1TO
18:FORL=1TO18:PRINT#D,GM(K,L):NE
XT:PRINT#D,OG(K):NEXT:FORK=1TO4:
PRINT#D,GR(K):NEXT:CLOSE
940 IFI=1THENI=0:MOTORON:FORK=1T
0600:NEXT:GOTO920ELSERETURN
950 CLS:PRINT:PRINT"LOAD FROM 1
TAPE OR 2 DISK":GOSUB1:IFI<1ORI>
2THEN950
960 D=1:IFI=1THEND=-1
970 OPEN"I",#D,"CURRSTAT":INPUT#
D,DC$:INPUT#D,SC$:FORK=0TO18:INP
UT#D,NA$(K):FORL=0TO18:INPUT#D,C
R(K,L):INPUT#D,CM(K,L):NEXT:INPU
T#D,OP(K):NEXT:FORK=1TO5:INPUT#D
,RB(K):NEXT:CLOSE
980 IFDT$<>""THENOPEN"I",#D,DT$:
INPUT#D,OP$:INPUT#D,DT$:FORK=1TO
18:FORL=1TO18:INPUT#D,GM(K,L):NE
XT:INPUT#D,OG(K):NEXT:FORK=1TO4:
INPUT#D,GR(K):NEXT:CLOSE
990 RETURN
1000 CLS:PRINT@42,"MAIN MENU":PR
INT:PRINT" 1 ENTER NEW GAME STAT
ISTICS":PRINT:PRINT" 2 EDIT/CORR
ECT CURRENT GAME FILE":PRI
NT:PRINT" 3 EDIT/CORRECT PREVIOU
S GAME FILE"
1002 PRINT:PRINT" 4 PRINT STATIS
TICS":PRINT:PRINT" 5 SORT ON AVE
RAGE"
1010 GOSUB1:ONI GOTO100,210,200,
600,800:GOTO1000
1020 PL=1
1030 IFNA$(PL)=""THEN110ELSEPL=P
L+1:GOTO1030
2000 CLEAR1000:DIMNA$(18),CR(18,
18),CM(18,18),GM(18,18),OG(18),O
P(18),GR(4),RB(5),OD(18),TM(18,1
8),TR(18,18):FT$="% %":GOT
O1000
2010 PCLEAR1:GOTO2000
```

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What's Bothering You About BASIC?

By Richard A. White
Rainbow Contributing Editor

I occasionally stew over what to write about next. A friend agreed that I have touched many of the principal basics. And then something comes up and an idea is born. Well, this month's article got just such a start and was well underway when some mail came from *the Rainbow* and I decided to save what had been written for later and start fresh. The writers asked some real basic questions that need answering and we will do that in this issue. What's bothering you about BASIC? Drop me a short note through *the Rainbow* and I may be able to answer your question as well.

Judith Almendariz from Illinois writes as follows. "I am a novice with computers . . . I find myself extremely frustrated each time people allude to *PEEK* and *POKE* statements. I can't find any books which adequately describe what exactly you are doing when you *PEEK* and *POKE*. Where do your contributing authors find the information as to what to *PEEK* or *POKE* into their programs to obtain the desired results?" Well, Judith, you need to understand how computers work to really understand what *PEEK* and *POKE* do. You are not alone, there are a whole lot of new computer owners struggling to understand their machines. Indeed, why buy a computer and study BASIC if not to learn how computers work and how to use them? Computer literacy comes only from much study and work. So, let's start the lesson.

A computer starts with memory. Memory consists of electronic circuits that can either be off or on. Each circuit is a "bit." If the circuit is on, the bit equals one, else it is a zero. You will also see the ON state represented as high (voltage) and OFF as low (voltage). In any case, only two states can exist. This is what binary means, two states.

These individual circuits, or bits, are grouped in blocks of eight which make up a byte. A byte is always eight bits. Bits in a byte can be set to define any number between 0 and 255 decimal. For example the byte "00000000" means zero. The byte "11111111" means 255. CoCo's memory is divided into byte-sized memory locations.

There are two types of memory. Read Only Memory, ROM, is made so the numbers are permanently fixed in the chip. You can turn the computer off and back on and the information in the ROM is always there for the microprocessor to use. Random Access Memory, RAM, is changeable. The microprocessor can put numbers into RAM locations as well as reading the numbers that are there. Further, RAM numbers exist only while the power is on. Turn the power off and all voltages in the RAM go to zero, destroying any stored data.

Our microprocessor does all its work by reading instruction and data numbers from memory and performing the action which the instruction numbers call for. Data numbers can mean many things depending on the program. These can include data addresses in memory, calculated numbers or numeric representations of characters.

Now a *PEEK* statement does nothing more than look at a memory location and return in decimal form the number contained in the byte stored there. Type in *PRINT PEEK (150)*. If you just started up your machine, an 87 will appear on your screen. You told CoCo to print the value stored in memory location 150. What does an 87 in memory location 150 mean to CoCo? When CoCo goes to send data to the printer, it needs to know the Baud rate or how fast to send. A routine in BASIC manages this transmission. It instructs the microprocessor to get the number in location 150 and use that number to determine how long each bit sent the printer should be.

POKE allows you to put a number ranging from 0 to 255 into a memory location. If your printer is set up for 1200 Baud, the number in location 150 should be 41. You need to set that with the statement *POKE 150,41*. *PEEK* and *POKE* can work with all the 65535 bytes that the microprocessor can address. What happens depends on what kind of memory or register is at the location addressed. *PEEK* will return a valid number from any address where there is ROM or RAM memory installed. It will even return numbers from *PEEKs* to addresses where there is no RAM. These are meaningless. A *POKE* to a RAM address will put the number into that address. Nothing happens when a number is *POKEd* to a ROM address or to an address where no memory is installed.

Where do you find what to *POKE*? The *POKE150,41* comes right out of the Color BASIC manual. Spectral Asso-

---

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS data base management program.)

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PIPELINE

THE STORIES ABOUND that there will be yet another Color Computer, or at least, another version of the CoCo within several months. We hear that from a number of places, but we also hear that the chances of any major modifications are not really very likely in the near future. Part of the rumors, obviously, are "scrambled" from word that leaked out on the new Tandy TRS-80 2000 — a "color computer" in that it has high resolution graphics and colors available. But this new computer from Tandy — a very sophisticated machine, by the way — is aimed at a very different market. With the rumors flying, it was easy to see how some things might have gotten a bit mixed up. Yes, we do see some changes in CoCo, but the chances are that, at least for the moment, those changes will be ones that will evolve in steps rather than by dramatic leaps.

Speaking of the Tandy 2000, it is an excellent machine which out IBM's IBM. Comments at the recent COMDEX show where it was unveiled were almost 100 percent enthusiastic. In fact, the 2000 may well be *the* state of the art personal business computer of the year. It is certainly a brighter contender for the honors than the new IBM entry, the PC*jr.*, or "Peanut," which also was at the show last month.

★ ★ ★

ONE OF THE HOTTEST buzzwords in the computer software field these days is "Windows," with the leader obviously being Microsoft, which has a program by that specific name. What a window is is a program which allows you to put several different "screens" from several different programs on the monitor at the same time. What with the Hi-Res capabilities of the CoCo, we would not be surprised to see some "Window" programs being offered for this market before very long. One of the things, though, that we thought landed in the "missed the boat" area as far as Microsoft's promotion was concerned was failure to recognize an opportunity to coin an old saying in selling their Windows program: "We *do* do Windows."

YOU DON'T OFTEN READ news about other Color Computer publications on these pages, simply because we do not make it our business to comment on anything which might be considered to be partisan in nature. But we have received a number of letters on the subject and we feel it only fair that you know that it is out understanding that *Color Computer News* is ceasing publication and that *Hot CoCo* has agreed to fulfill the outstanding *CCN* subscriptions. From what we hear, that means *CCN* subscribers will get issues of *Hot CoCo* until their *CCN* subscriptions run out.

★ ★ ★

MARKETING THESE wonderful machines we use in our work and play is at the heart of industry health, and so when we found a recent Radio Shack news release announcing the promotion of Ron G. Stegall to senior vice president, computer marketing, we very carefully penciled "Pipeline" at the top of the page. We're pleased to recognize this step up for Ron to a position so closely related to the health and well-being of all of us. In his new capacity, Ron will be responsible for the overall marketing effort of the more than 400 Radio Shack Computer Centers and more than 630 Radio Shack Computer Departments nationwide, as well as other account, education and procurement duties.

And while we're speaking of new Radio Shack vice presidents, we should mention William D. Gattis's new appointment to the position of vice president, Radio Shack Education Division. He will be responsible for the development and overall marketing of microcomputer products, instructional software and courseware systems for educational applications. Congratulations to both of these gentlemen, and our thanks for the job they have done for the Color Computer and the industry.

★ ★ ★

WEST COAST ROCK fans are developing modemania, it seems, as Portland rock station KGON 92FM has begun operating a new BBS for hard-rock hackers, or "user-listeners" as the station says.

The KGON BBS will initially consist of a dozen menu options including not only the top 40 rock songs in the Portland area, but the top 10 software sales and the top 20 videocassette rentals. News, rock news and concert reviews, as well as an E-mail service, will also be available to those calling KGON's data line at (503) 655-9181. And what would the West Coast be without its preoccupation with lifestyle? Well, it would still be beautiful, but nevertheless, lifestyle information is yours for the dialing, too.

The operational hours for KGON BBS are from 6 p.m. to 6 a.m. Monday through Friday, and around the clock on weekends and holidays. Sysop Chris Burns, who is also KGON's news director, informs us that calls are limited to 15 minutes. The system is comprised of a 64K Color Computer, two Radio Shack disk drives, and a Hayes Smartmodem 300. Give 'em a call. Long live Hack N' Roll!

★ ★ ★

THAR'S GOLD in them thar controller modules, says the E.A.P. Company of Keller, Texas, but don't rush 'em off to your local assayer; instead, plug 'em into your ROM port and eliminate the problems of poor contact that often cause such things as directory errors and inaccessible data. We're speaking of a disk module kit called Gold Plug-80.

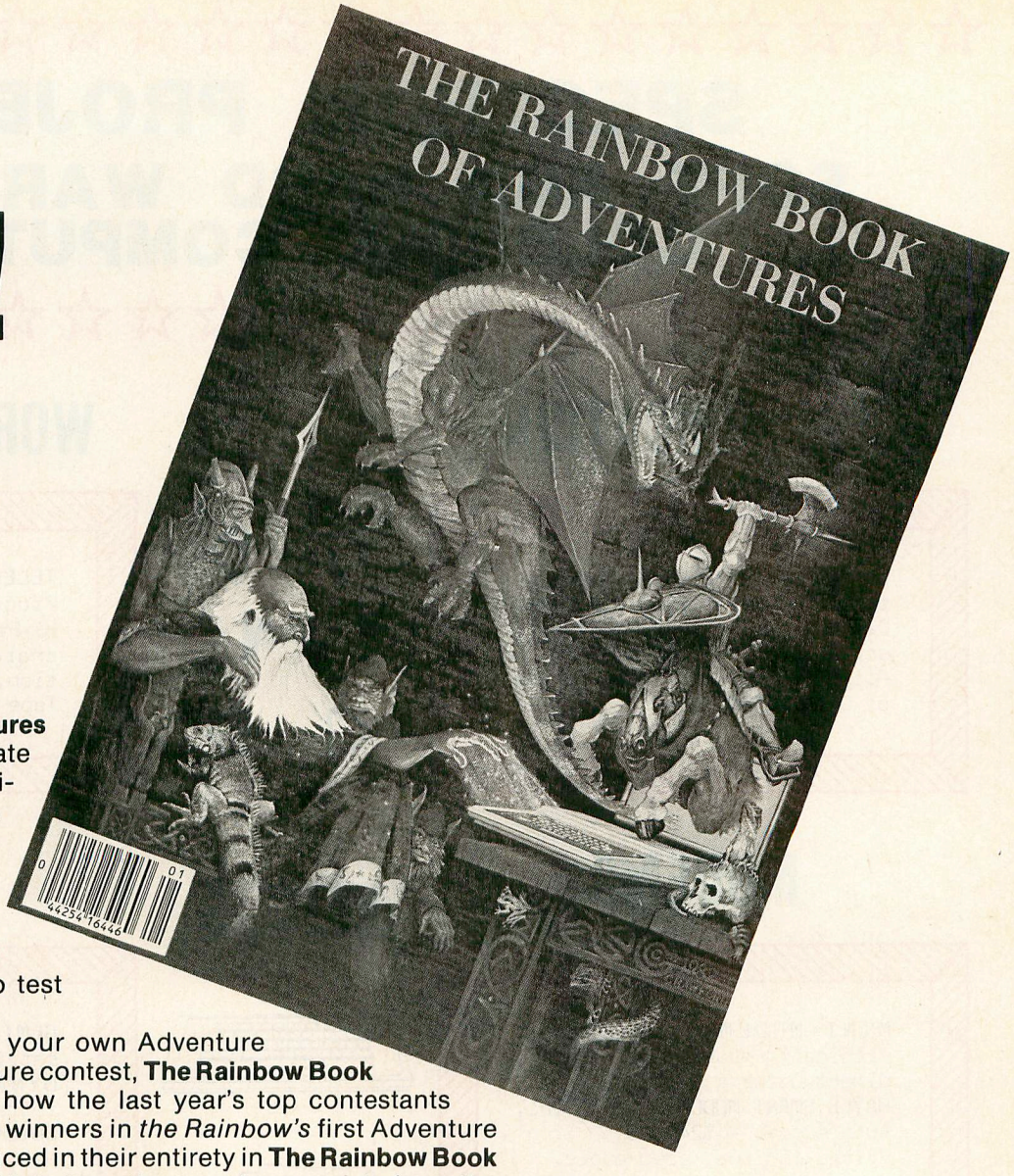
Ground tab extensions are included in the kit which extend the ground tabs far enough to contact the ground clips on the CoCo female connector, reducing RFI.

E.A.P. Company sells various versions of the Gold Plug-80 for between $10 and $20. They also have gold-plated drive cables. Write them at P.O. Box 14. Their zip is 76248.

★ ★ ★

RENDERING UNTO SEIZURE by the IRS that portion of your annual earnings we call taxes can be less taxing, at least on your time and disposition, if you use the new CoCo Taxpreparer by Micro Data Systems. Besides handling the calculations you'll need for a finished return, this program will provide printer outputs directly on government approved forms and schedules using pin feed or tractor feed printers. CoCo Taxpreparer requires 32K Extended BASIC and a disk drive. It costs $149.95 and you can contact the company at 6 Edward Drive, Ashland, Mass., 01721.

It's here!



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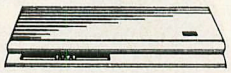

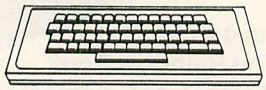

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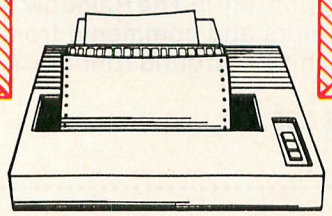

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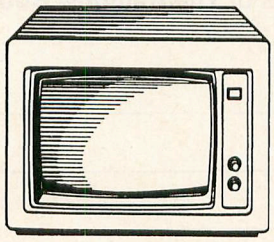

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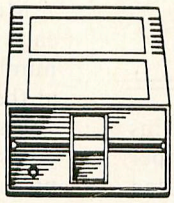

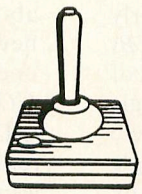

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ciates' book, "The Facts" is full of memory locations and their contents. Bob Russell's "Color Computer" Memory Map appeared in four installments in the 1983 issues of *the Rainbow* and may be ordered for $9 (Bob Russell, 5474 Stillwater Court, Fredonia,Wis. 53021). These are good references, but to know that the cursor color is stored at a certain location doesn't help much if you are not interested in changing the cursor.

A better way is to follow the programming articles and hints in *the Rainbow* and see where authors are *PEEKing, POKEing,* why they are doing it and what kind of results are obtained. *PEEKs* and *POKEs* are not as important to CoCo as they are to competing machines. For example, we have BASIC commands for graphics while Apple, Commodore and Atari need to *POKE* numbers to get similar results. And why remember to *POKE 65313,4* to turn the cassette motor on when the BASIC command *MOTORON* does the same thing easier? Oh, you just had to try it, did you, and now *MOTOROFF* won't turn the cassette off? *POKE 65313,52.*

I hope that helps, Judith. You even got the tutorial you wanted.

"Note that in all of this, that the guiding principle is what makes it easiest for you, the programmer."

F. Bruhns from California asked for an article on the ins and outs of multiple statements under the same line number including what works and what does not. A well stated request, so here goes. Line numbers are used by BASIC to define the start of a block of code. They are particularly important in defining the targets for *GOTOs* and *GOSUBs* and line calls after *THEN.* A line number may be thought of as an address. Think of two houses, one where a single person lives and one where there is a big family complete with grandparents. The mailman delivers mail to a single mailbox in each case. It generally does not matter how many live in the house. In BASIC this is true as well in that one or many statements may be on a line.

Now should the grandparents have a separate entry and part of the big house and wish to get their mail directly, they would put up their own mailbox and have a separate address. We would put them under a different line number so their mail can *GOTO* them directly. So, subroutines and code blocks that are targets of *GOTOs* elsewhere in the program start with separate line numbers.

Just as many people can live in a house, many statements can be under a single line number. Each is separated by a colon (:). The limit is the number of characters the keyboard buffer will accept. I count 249 characters. You can stuff even more if you use a program like Eigen's *Stripper* which combines lines of tokenized BASIC.

After you enter a line, it goes through a tokenizing process that converts all keywords like *PRINT, POKE, INPUT* etc., to one or two numbers unique to each. Obviously, fewer bytes are needed to store the tokenized line of code, and *Stripper* simply combines tokenized lines within certain rules to fill out to 250 bytes capacity. Five more bytes are used for the line number, the address of the next line in memory and the 0 at the end of the line.

One rule is that a line called by a *GOTO* or a *GOSUB* is not added to the line above it. Another is that a following line cannot be added to the line above when the first line ends with an *IF/THEN* statement. *IF/THEN* is a control structure that is managing program action. One action can be to fall to the line below if the test made after *IF* is untrue. Obviously that could not happen if the statements in line below were instead after the *THEN.* So think out what is happening after *IF/THEN* statements. And while we are on *IF/THEN/ELSE,* no colon is used after *IF* or on either side of *THEN* or *ELSE.*

In some instances quite a bit of code is needed after *THEN* and *ELSE* to get all the work done that is needed. Resist the temptation to keep the line short by putting the statements in the line below which you then have to be jumping over. I think it is easier to trouble shoot program logic if all code is in one line.

I know what you are thinking. If a line has fifteen statements in it, how do I find which one caused the Syntax Error or whatever bombed in that line? One way is to edit a number of *STOP* statements into the line. Each time BASIC meets a stop it stops the program and says BREAK IN XYZ. When you type CONT, BASIC will pick up with the code after the *STOP.* If you put three *STOPs* in a line and get two *BREAKs* and then the SN ERROR, you have narrowed your problem to only that code between the second and third *STOP.*

Multiple statements in a line save memory. Remember each line of BASIC in memory has two bytes for the line number, two bytes for the address of the next line and the 0 at the end. Each time you can combine two lines into one, you save five bytes. When you combine 10 lines into one, you save 50 bytes. The savings can really mount up and the program will run faster, too.

While we are talking about line numbers, what is sacred about spacing lines 10 apart? This leaves room for adding in new code later if needed. I like small line numbers. It takes one byte less to *GOTO 100* than to *GOTO 1000.* I like *GOTO 10* even better.

Don't feel that when the program is done you need to renumber to get back your spacing of 10 line numbers. This is more harmful than helpful if you need to edit later. As you wrote the program you got used to certain things being at certain lines and now *RENUM* will change all that. I assign blocks of code to line number blocks of 50 or 100 and even write at spacings of two to get in all I need to. As I work up a program, I know exactly which block to go to to change something. For example, I always put a main menu at 1000 and tape and disk I/O between 900 and 1000. When the program is done I may *RENUM0,0,1* to start the program at line 0 with spacing of 1. This uses least memory. I make sure to save a copy of the program before I do a *RENUM.* If problems develop later I go to the "uncompressed" version, edit it and then *RENUM* it to get a new working version.

Note in all of this, that the guiding principle is what makes it easiest for you, the programmer. CoCo could care less how far the lines are spaced or what's in them as long as syntax is right. Also CoCo is not concerned about program logic, but just does what it's told. If you find it easier to line number at intervals of 10 and put only one or two statements per line, then that is the right way for you.

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( ) THE STRIPPER
( ) FAST DUPE
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BASKET

Play By Play Simulation Challenge

In sports, you can't beat the real thing. The crack of the bat splitting a steamy afternoon; the spiral of a football through an apple cider evening; the swish of the net joining the swoosh of the wintry wind outside.

But for the traditional sports fan, the real thing isn't enough. Too often there are no games on TV (horrors!) or at the local gym, and you are left to play board or computer versions.

Now, sports simulations on a microcomputer can be fun, but they can also become boring for someone interested in recreating the real-world game. In many cases, sports simulations are arcade-type adaptations. What our dedicated sports fan is looking for is something that allows him to make coaching or managing decisions; that permits him to create teams that emulate real-world teams, with varying strengths and weaknesses; that provides realistic results both in play-by-play and in season-long action; and that does all this without being too complicated.

Of the three major U.S. sports—baseball, football and basketball—it is basketball that provides the biggest challenge in finding a happy balance between realism and ease of play. To keep track of all 10 players on the court becomes too confusing and bogs down a game that must keep moving. Yet we want more than simply, "Team A has the ball.

By Gary L. Carter

(Gary Carter, a University of Illinois graduate, has worked as a reporter and copy editor in Virginia and Illinois. Since 1982, he has been system operator of the videotex service of the Bloomington [Ill.] Pantagraph newspaper. He was playing and creating sports simulation games long before discovering computers.)

Will they shoot?"

Basket was created by this fan with the above ideas in mind. It is not the ideal solution, but I think it does aim in the right direction. This is not a fancy program, nor a pretty one. You'll find subroutines popping up like weeds all through it. Like my garden, it wasn't planned that way. That's just how it grew.

You can play either a college or a high school version. First, *PCLEAR 1*, then load and *RUN* the program. For each team you will be asked to enter ratings in four categories: outside shooting, inside strength, defense and quickness. In each case the ratings should be in the range of .3 (poor) to .7 (best), with .45 to .5 as the average.

"Outside shooting" represents the general shooting percentage of the guards, whose range is considered to extend to 20 feet. "Inside strength" roughly corresponds to the height and strength of the team's center and forwards. It represents their shooting percentage within 10 feet (except for shots under the basket) and their rebounding ability.

The defense rating is used alone when the team is in a zone defense (lines 8010-8011) and combines with quickness for a man-to-man defense (8200-8201). Quickness and defense also determine a team's ability to drive to the basket (8640). Defense combines with inside strength on defensive rebounds (3030-3040) and quickness affects turnovers (513-516, 1025).

After the ratings are entered you will see an empty scoreboard and statistics chart showing field goals attempted (FGA), field goals (FG), free throws attempted (FTA), free throws (FT), rebounds (RB) and fouls. This chart will appear after each period, and can be viewed before shooting free throws. After play starts, the list also will contain turnovers (TO), field goal percentage (FG PCT) and free throw percentage (FT PCT).

Next, you can select to coach both teams (two-person game), coach vs. CoCo (one-person game), let CoCo play by itself or let CoCo play until the final few minutes.

If you choose option 2, you will coach team 1 while the computer makes the decisions for team 2. In option 3, the computer directs both teams.

If you choose the last option, you will be asked, "How many minutes?" That is, at what point do you want the computer to hand the coaching duties over to you? Then you will be asked, "Switch to which mode?" Select 1 or 2, coach both teams or coach vs. CoCo. (When the clock gets to the point you specified, the program will pause to tell you it is time to change modes.)

Once the game starts, the action keeps moving. If no option is selected within a certain length of time when an option menu appears on the screen, the program will select a default response and continue. (When the computer is coaching, of course, it will make decisions of its own.)

The length of time can be varied by pressing the up arrow

Rainbow Check Plus

17 ..... 02C3	193	1050 ..... 17D2	238
53 0540	44	4003 .... 19DE	244
100 0764	61	5010 .... 1C4D	4
402 ..... 09F4	159	6110 ..... 1E6F	92
554 ..... 0C1D	23	7040 2134	59
644 ..... 0E53	105	8200 .... 23CE	16
740 1080	73	8475 2680	186
818 ..... 12EB	245	8610 2865	161
950 1550	177	END 2B3E	242

The listing:

```
1 CLS'2-27-83
2 PRINTTAB(10)"BASKETBALL":PRINT
TAB(7)"BY GARY L.CARTER":REM 171
0 WILDWOOD, BLOOMINGTON IL 61701
3 INPUT"hIGH SCHOOL OR cOLLEGE";
LV$:IFLV$<>"H"ANDLV$<>"C"THEN3
4 IFLV$="C"THENN1=2
5 DIMG(1),S(1),Z$(1),Y$(4):G(0)=
2:G(1)=2:DL=100:Y$(1)="MAN":Y$(2
)="ZONE":Y$(3)="GO FOR BALL"
7 CLS:IFLV$="H"THENMM=8:H$="1ST
QTR":GOTO26
8 MM=20:H$="1ST HALF":GOTO26
9 FORL=1TODL
10 Q$=INKEY$:IFQ$=""THEN11ELSEIF
Q$=CHR$(10)THENDL=DL+9ELSEIFQ$="
^"THENDL=DL-9:IFDL<1THENDL=1
11 NEXT:RETURN
12 PRINT"WILL YOU:":PRINT"COACH
BOTH TEAMS(1)":PRINT"COACH VS. C
OCO(2)"
14 PRINT"LET COCO PLAY(3)":INPUT
"OR LET COCO PLAY UNTIL FINAL
 FEW MINUTES(4)";CP
15 IFCP=1THENPRINTA$" USES THE 1
-4 KEYS;",B$" USES THE 7-O KEYS.
","PUSH <ENTER> WHEN READY":LINE
INPUTQ$
17 IFCP=4THENINPUT"HOW MANY MINU
TES";E:INPUT"SWITCH TO WHICH MOD
E";Z
18 IFCP=2THENPRINT"YOU ARE "A$,"
USE KEYS 1-4"
19 PRINT:PRINT"USE THE ARROW KEY
S TO SPEED up  OR SLOW down THE
PROGRAM":FORX=1TO4:GOSUB9:NEXT:G
OTO155
26 INPUT"FIRST TEAM'S NAME IS";A
$
28 INPUT"OUTSIDE SHOOTING (.3-.7
)";OA
30 INPUT"INSIDE STRENGTH (.3-.7)
";IA
31 INPUT"DEFENSE (.3-.7)";DA
32 INPUT"QUICKNESS (.3-.7)";QA
33 INPUT"cHANGES";Q$:IFQ$="C"THE
N26
35 INPUT"NEXT TEAM'S NAME IS";B$
36 INPUT"OUTSIDE SHOOTING (.3-.7
)";OB
37 INPUT"INSIDE STRENGTH (.3-.7)
";IB
38 INPUT"DEFENSE (.3-.7)";DB
39 INPUT"QUICKNESS (.3-.7)";QB
40 INPUT"cHANGES";Q$:IFQ$="C"THE
N35
42 IFLEN(A$)<LEN(B$)THEN45
```

to speed up the program or the down arrow to slow it down. This works only when the clock is running, or when the message is on the screen before each period. Note lines 9 through 11, the delay subroutine. Each time through, line 10 checks for the arrow keys and adds to or subtracts from DL accordingly. DL determines the length of the *FOR/NEXT* loop in Line 9.

As the game starts, the top line on the screen will identify the team with the ball (we still have the old jump ball before each period). The second line will show what alignment the defensive team used the previous time down the floor. This will be blank the first time, of course.

Below this will appear a prompt for the defensive coach to select a defensive alignment. If he makes no choice within the time limit, the defense used last will be retained. The prompt line looks like this:

(TEAM NAME) MAN (1-7), ZONE (2-8)
GO FOR BALL (3-9), OR FOUL (0-4)
(Foul and go for ball are for desperate situations.)

Here's what those numbers mean: The player directing team 1 will use keys 1, 2, 3 and 4 to make his selections. The player directing team 2 (if any) will use keys 7, 8, 9 and 0. It is up to the players to keep track of who is on offense and who is on defense. I've found the game works best if the defensive player keeps his hand off the keyboard except when he needs to make a choice.

After the defensive choice is made, the screen will clear, the top lines will reappear and the computer will tell whether the ball is in the hands of a guard or a "big man" (center or forward), how far he is from the basket and whether he is open or guarded. Below this you will see:

PRESS (SPACE) TO SHOOT
(1-7) TO DRIVE
(2-8) TO STALL

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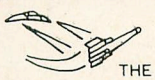

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RAINBOW CERTIFICATION SEAL


```
43 IFLEN(B$)<LEN(A$)THEN46
44 CLS5:GOTO50
45 A$=" "+A$:GOTO42
46 B$=" "+B$:GOTO43
50 IFLEFT$(H$,3)<>"1ST"THEN55
52 AA$=A$+"-"
53 BB$=B$+"-"
54 GOTO58
55 AA$=AA$+"-"+STR$(S(0))
56 BB$=BB$+"-"+STR$(S(1))
58 GOSUB60:GOTO120
60 GOSUB2550:PRINT@22,H$
64 PRINT@64,AA$
66 PRINTBB$
69 PRINTTAB(16-LEN(A$))A$TAB(27-
LEN(B$))B$
70 PRINT"FGA"TAB(14)AU TAB(23)BU
72 PRINT"FG"TAB(14)AV TAB(23)BV
74 PRINT"FTA"TAB(14)AW TAB(23)BW
76 PRINT"FT"TAB(14)AX TAB(23)BX
78 PRINT"RB"TAB(14)AR TAB(23)BR
80 PRINT"FOULS"TAB(14)AF TAB(23)
BF
82 IFAU=0ORBU=0THEN92
85 PRINT"TO"TAB(14)AT TAB(23)BT
90 PRINT"FG PCT"TAB(13);:PRINTUS
ING".###      ";AV/AU,BV/BU
92 IFAW=0ANDBW=0THEN101
94 IFAW=0THEN98
95 IF BW=0THEN100
96 PRINT"FT PCT"TAB(13);:PRINTUS
ING".###      ";AX/AW,BX/BW:GOTO1
01
98 PRINT"FT PCT"TAB(22);:PRINTUS
ING".###";BX/BW:GOTO101
100 PRINT"FT PCT"TAB(13);:PRINTU
SING".###";AX/AW
101 IFPR THENRETURNELSEIFH$="FIN
AL"THEN9500
102 PRINT"PRESS ANY KEY TO CONTI
NUE"
104 F=RND(0):J$=INKEY$:IFJ$=""TH
EN104
105 RETURN
120 IFH$<>"HALFTIME"THEN145
121 H$="2ND HALF":MM=20
122 VA=0:VB=0
145 CLS:GOTO12
155 F=RND(0)
160 IFF<.5THENT=1
161 GOSUB5000:GOSUB9000
180 GOSUB9'DEF OPT
183 IFG(TT)>2THENG(TT)=2
185 K=0:GF=0:XX=0:RB=0
190 PRINT:PRINTD$" MAN(1-7), ZON
E(2-8),":PRINT"  GO FOR BALL(3-9
), OR FOUL(4-0)"
191 IFCP=1THEN195
192 IFCP=2ANDT=1THEN195
```

(3-9) TO PASS

If no choice is made within the time limit, Pass is selected. Both players use the space bar to shoot. Free throws are shot automatically. You'll hear a "beep" when points are scored.

Passing is most effective against the zone defense; driving is most effective against a man-to-man. Shooting is most effective when the ball-handler is open and within 20 feet for guards or 10 feet for big men.

If a shot is good or the ball is turned over out of bounds, the screen will clear to orange to indicate the ball changes hands, and the new defensive team will be asked to choose among fall back, press, go for the ball or foul. The default choice is fall back. If the ball does not go out of bounds when it changes hands (defensive rebound, for instance), this option is not available.

Missed shots sometimes are tipped back up automatically, sometimes are knocked to the backcourt, and sometimes result in fast breaks that lead automatically to layups.

After a team commits 20 fouls, and every five fouls thereafter, it is arbitrarily assumed that a player has fouled out, and the team's defensive rating and either the outside or inside ratings drop .05 each. If the program says player 1 or 2 has fouled out, a guard leaves and the outside rating drops. Otherwise, a big man leaves and the inside rating drops.

That's about all you need to know to play *Basket*. You'll find that sometimes scores seem to go against the ratings; a poor team upsets a good one, or two evenly matched teams can end up 20 points apart. But this can happen in real basketball, too, and much depends upon the player's strategy and shot selection. And then, sometimes you get the breaks and sometimes you don't. That's the way the keyboard bounces.

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```
193 GOSUB6000:GOTO225
195 FORL=1TO(DL*2)
200 J$=INKEY$:G=VAL(J$)
203 IFT THEN207
205 G=G-6:IFJ$="0"THENG=4
207 IFG>0ANDG<5THEN225
210 NEXTL
215 GOTO230
225 G(TT)=G:Z$(TT)=Y$(G)
230 ONG(TT)GOTO500,500,245,400
245 F=RND(7):GF=1:SS=SS-RND(2)
250 ONF GOTO640,640,640,700:GOTO
500
400 PRINTD$" INTENTIONAL FOUL"
402 K=2:SS=SS-RND(2)
404 GOTO619
500 'OFFENSE RESULTS
505 PRINT"PASS":GOSUB9:D=G(TT):I
FDV>4THENPRINT"3-SECOND CALL":BG
=1:DV=0:GOTO706
510 IFXX=0THEN520
512 F=RND(0):IFT THENQ=(QA-QB+.5
)/(4*D)ELSEQ=(QB-QA+.5)/(4*D)
514 IFF<Q THEN700
515 IFF<Q+(.01/D)THEN675
516 IFF<Q+(.03/D)THEN640
520 K=0:GOSUB2500:IFCL=1THEN930
525 RB=0
527 XX=XX+1:IFXX>4AND(RA>250RMM=
0)THEN180
530 IFST=1THEN8000
535 IFS=1THEN538
536 GOSUB8000:IFCL THEN930
537 IFS$<>" "THEN505
538 S=0:H=RND(10):F=RND(0):PRINT
"SHOOT":GOSUB9
539 IFPC>.6THENF=F+.2ELSEIFPC<.3
5THENF=F-.2
540 IFF>OF THEN542
541 IFH=1THEN590ELSE575
542 IFH=1THEN615
543 F=RND(0):IFF<.06THEN790
546 IFT THENR=BB ELSER=BA
550 G=.4+(R*.1):F=RND(0)
554 IFF<G THEN720
556 GOTO800
575 'BG
576 S=0
577 S(T)=S(T)+2:IFT=0THEN581
579 BU=BU+1:BV=BV+1:GOTO583
581 AU=AU+1:AV=AV+1
583 BG=1:PRINT "BASKET GOOD":SOU
ND150,2
587 GOTO870
590 'BG, FOUL
592 S(T)=S(T)+2:IFT=0THEN596
594 BU=BU+1:BV=BV+1:AF=AF+1:GOTO
598
596 AU=AU+1:AV=AV+1:BF=BF+1
```

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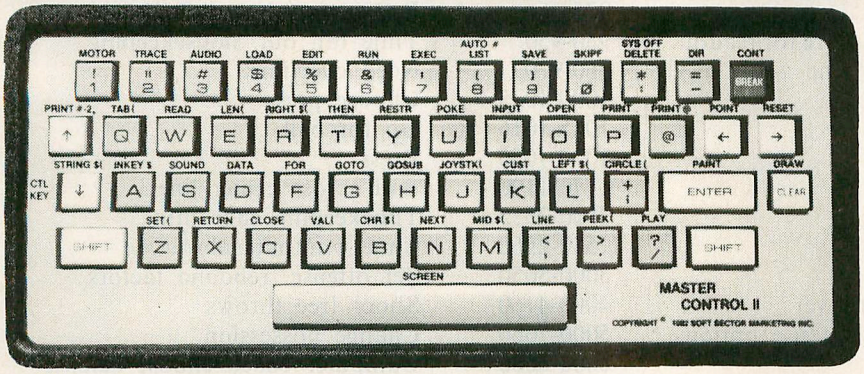

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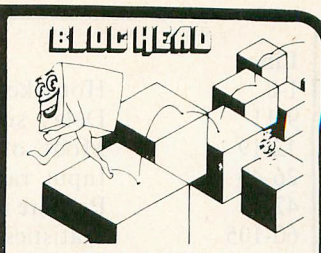

BLOC HEAD

Q-BERT never looked so good! You guide Bloc Head from cube to cube, changing the brightly colored surfaces while dodging the despicable characters they try to push him off. He must clear the cubes to go to the next skill level. Requires 16K.

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JUNIOR'S REVENGE

The same Junior you've seen in the Kong arcade series. This young but tireless little ape must overcome four screens of obstacles to rescue his father. The King, from mean old Luigi. He will traverse the jungle & the swamp, climb vines, avoid vine gators, dodge Zuzu birds, open locks & finally conquer Luigi's hideout before he finally frees his daddy. Requires 32K.

Cassette $28.95

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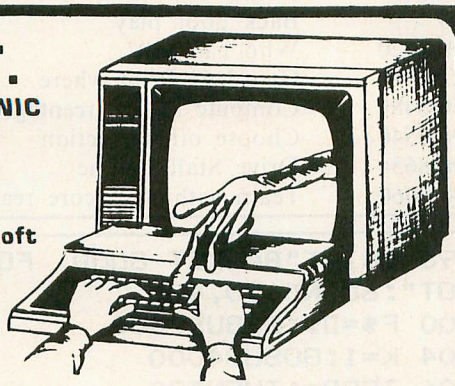
ELECTRONIC TYPING TEACHER by CHERRYSoft



Learning to type the right way can save you hours of tedious work when entering programs into your CoCo, and this is just what ETT was designed to do. Devote a little time every day practicing with ETT and before you know it you will be typing with confidence. Entering those programs will no longer be the chore it used to be.

ETT's viedo keyboard lets you practice with all the keys labeled, all the keys blank or only the "home" keys labeled. The visual cues guide you while you learn to type without watching your fingers. ETT shows your accuracy, response time, and words per minute. You will quickly see that you are improving with practice.

With the sentences provided by ETT learning to type can be fun, over 1000 variations, chosen because they include every letter in the alphabet. You can also create your own practice sets. This outstanding program was written by a certified teacher and professional programmer and comes with a ten page student manual-study guide. Requires 16K Extented Basic.

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TABLE 1

Lines	
1-8	Housekeeping
9-11	Delay subroutine
12-19	Mode of play routine
26-40	Input ratings
42-58	Prepare team names and score for readout
60-105	Statistics readout subroutine
104	Vary random number
120-145	Housekeeping
155-161	Jump ball
180-230	Choose defense
245-250	Go for ball
400-404	Intentional foul
500-856	Offense results
500-516	Pass/Drive look for turnover
520-527	Pass/Drive check time, defense option
530	Stall? Then jump
535-537	Shooting? Then jump, else check again
538-830	Shot results
539-543	Jump to various results
546-556	Decide who gets rebound
575-587	Basket good
590-610	Basket good, foul
615-633	No good, foul
640-666	Defense foul before shot
675-687	Offensive foul
700-710	Turnover
720-784	No good, offensive rebound
740-760	Tipped up
790-796	No good, rebound out of bounds
800-818	No good, defensive rebound
825-830	No good, foul on rebound
850-856	Fast break
870-925	Wrap up trip down floor
890	Offensive guard rebound? Then jump
920	Foul on press? Then jump
925	Ball out of bounds? Then jump
930-950	Time ran out; housekeeping
960-970	Need overtime?
1000-1013	Choose press
1015-1016	Go for ball
1020-1050	Press
1170-1190	Ball across center line
2500-2535	Timekeeping subroutine
2550-2560	Time printout subroutine
3000-3050	Set offense, rebound factors
4000-4160	Shoot free throws
5000-5060	Change possession
6000-6080	Computer coach choose defense
6100-6110	Computer coach choose press
6500-6620	Computer coach choose offense action
7000-7202	Foul tote, foul out
8000-8654	Locate ball, choose offense action
8000	Sometimes nobody is open
8010-8110	Locate ball vs. zone
8200-8240	Locate ball vs. man-to-man
8300-8320	Locate ball vs. go for ball
8310	Back door play
8400-8420	Who has ball?
8425-8440	Guarded? Print where
8450-8488	Compute shot percentage
8490-8540	Choose offense action
8600-8654	Drive/Stall routine
9000-9060	Team with ball/score readout

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```
598 PRINT"BASKET GOOD, FOUL ON S
HOT":SOUND150,4
600 F$=D$:GOSUB7000
604 K=1:GOSUB4000
606 IFRB=1THEN520
610 GOTO872
615 'NG, FOUL
618 PRINT"SHOT MISSED, FOUL ON S
HOT"
619 IFO$=A$THENBF=BF+1ELSEAF=AF+
1
623 F$=D$:GOSUB7000
627 K=2:GOSUB4000
629 IFRB=1THEN520
633 GOTO872
640 'DEF FOUL
641 GF=0:S=0:SS=SS-1
643 GOSUB2500:IFCL THEN930ELSEGO
SUB2550
644 PRINT"DEFENSE FOUL BEFORE SH
OT"
646 F$=D$:GOSUB7000:GOSUB9
648 IFT=0THEN654
650 AF=AF+1
652 IFVA>4+N1 THEN663ELSE660
654 BF=BF+1
656 IFVB>4+N1 THEN663
660 PRINTO$" BALL OUT OF BOUNDS"
:TN=0:IFCP>2THEN662
```

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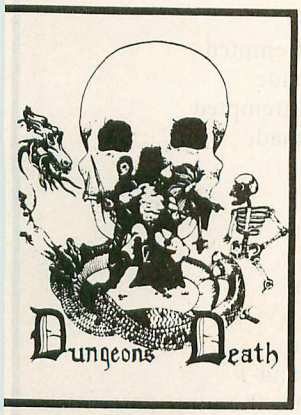

DUNGEONS OF DEATH - A serious role playing game for up to 6 players. You get a choice of race and characters that grow from game to game. You also get a graphic maze and a 15 page manual.

Available On: TRS80C 16K EXT., CMD64, VIC20 13K, IBMPC, TRS80C 32K, MC10 16K

TAPE $14.95 DISK $19.95

BAG-IT-MAN - The ultimate arcade game for TRS80C or MCD64. This one has three screens full of BAGS OF GOLD, CARTS & ELEVATORS TO RIDE IN, MINE SHAFTS, and TWO NASTY GUARDS. Great sound and color and continuous excitement.

Available On: TRS80C 32K, CMD64

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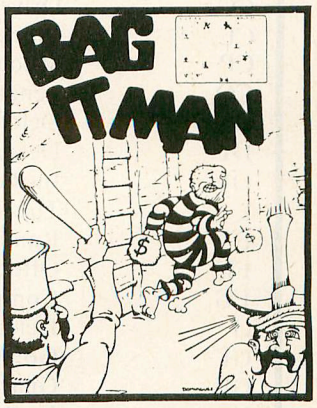

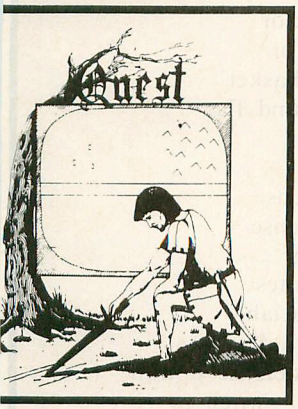

QUEST - A different kind of Graphic Adventure, it is played on a computer generated mape of Alesia. You'll have to build an army and feed them through combat, bargaining, exploration of ruins and temples, and outright banditry! Takes 2 - 5 hours to play and is different each time.

Available On: TRS80C 16K, CMD64, VIC20 13K, MC10 16K, TI99 (EXT. BASIC), IBMPC

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STARFIRE - If you enjoyed StarRaiders or StarWars, you will love Starfire. It is not a copy, but the best shoot-em-up, see them in the window space game on the CMD64 or TRS80C. The fantastic graphics will put you right in the control room as you hyperspace from quadrant to quadrant fighting the aliens and protecting your bases.

Available On: TRS80C 16K, CMD64

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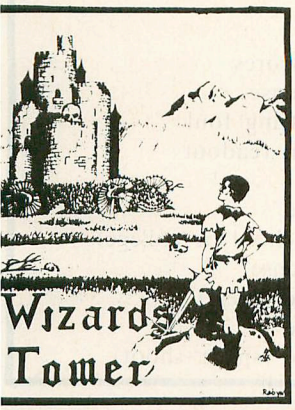

WIZARDS TOWER - A fantasy game played on a map of forests and dungeons - with dragons and wizards to kill. Similar to QUEST and fun for adults, but a little simpler and playable for the younger set (8 - 60).

Available On: TRS80C 16K EXT., CMD64, VIC20 13K, TI99, IBMPC

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PYRAMID - ONE OF THE TOUGHEST ADVENTURES. Average time through the pyramid is 50 - 70 hours. Clues are everywhere and some ingenious problems make this popular around the world.

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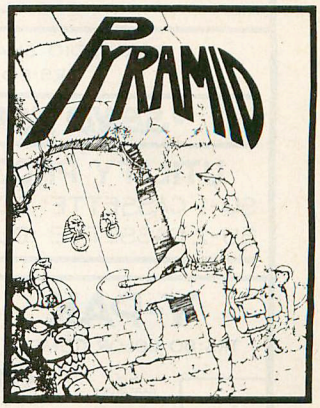

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TABLE 2

Others

MM	Minutes
SS	Seconds
BA/BB	Rebound factors
BG	Ball out of bounds to defense flag
CC	Drive flag
CL	Clock flag
CP	Mode of play
CQ	Length of possession
D	Defense factor
DL	Delay
DV	In-the-lane counter
E	Time to switch mode of play
F	Random number
FF	Offense factor
FG	Computer ball control flag
G	Defense selection; rebound factor
GF	Go for ball flag
GU	Guarded/open flag
H	Foul on shot flag
J	Free throw missed flag
K	Number of free throws to shoot

Variables

Arrays

G(1)	Defense number
S(1)	Score
Y$(4)	Names of defenses
Z$(1)	Names of defenses in use

Ratings

OA/OB	Outside shooting
IA/IB	Inside strength
DA/DB	Defense
QA/QB	Quickness

Statistics

AU/BU	Field goals attempted
AV/BV	Field goals made
AW/BW	Free throws attempted
AX/BX	Free throws made
AR/BR	Rebounds
AF/BF	Fouls
AT/BT	Turnovers
VA/VB	Fouls in half
L	Work variable
M	Range limit
N	Work variable
N1	Factor for 1-and-1
PC	Factor to limit shooting percentage
PN	Press option
Q	Quickness factor
R	Rebound factor
RA	Range from basket
RB	Defense rebound flag
S	Offense choice
ST	Stall flag
T	Team on offense
TT	Team on defense
TN	Turnover flag
W, X, Y	Free throw totes
X	Also work variable
WB	Man with ball flag
XX	Counter for defense option
Z	Play mode to switch to

Strings

A$/B$	Team names
AA$/BB$	Names plus scores
D$	Team on defense
F$	Team committing foul
GU$	Guarded/open readout
H$	Period
J$	Input/variable
LV$	Level (high school or college)
O$	Team on offense
PN$	Input variable (press)
Q$	Input variable
S$	Input variable (space=shoot)

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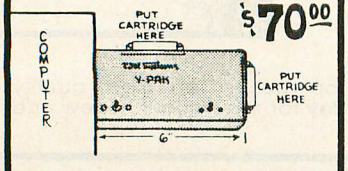

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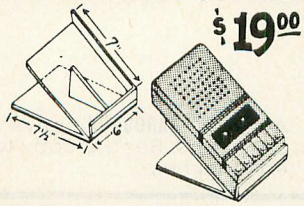

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```
661 GOSUB9:GOSUB9
662 GOTO180
663 K=3:GOSUB4000
664 IFRB<>1THEN872
666 RB=0:GOTO737
675 'OFF FOUL
677 PRINT"OFFENSIVE FOUL"
678 BG=1
681 F$=O$:GOSUB7000
683 IFO$=A$THEN687
685 BF=BF+1:GOTO870
687 AF=AF+1:GOTO870
700 'TO
```

```
704 IFRND(2)=1THENPRINT"BAD PASS
":BG=RND(2)-1:ELSEPRINT"TRAVELIN
G":BG=1
706 IFT=0THENAT=AT+1ELSEBT=BT+1
710 GOTO870
720 'NG,OFF RB
721 IFT THENBU=BU+1ELSEAU=AU+1
722 F=RND(0):IFF<.1THEN825
725 PRINT"SHOT MISSED, RB TO "O$
735 GOSUB9
737 F=RND(0):RB=0
740 IFF>.25THEN770
742 F=RND(0):SS=SS-1:GOSUB2500:I
FCL THEN930
744 PRINT "RB TIPPED UP"
746 IFF<.6THEN760
748 F=RND(0)
749 IFF>.6THEN725
752 GOTO804
760 GOTO577
770 IFT=0THENAR=AR+1ELSEBR=BR+1
772 F=RND(0):IFF>.9THEN780
774 SS=SS-1:GOSUB2500:IFCL THEN9
30
775 RA=RND(4):GU=RND(2):GOSUB9
777 CLS3:GOSUB8400
778 IFS$=" "THEN538
780 SS=SS-RND(3)
782 GOSUB9
784 GOTO520
790 PRINT"SHOT MISSED":PRINT"RB
OUT OF BOUNDS TO ";:GOSUB9
791 IFT=0THENAU=AU+1ELSEBU=BU+1
792 F=RND(2):IFF=2THEN796
794 PRINTD$:BG=1:GOSUB9:GOTO870
796 PRINTO$:GOSUB9:GOTO180
800 'NG,DEF RB
801 IFT THENBU=BU+1ELSEAU=AU+1
802 F=RND(0):IFF<.1THEN825
804 PRINT"SHOT MISSED, REBOUND T
O "D$
806 F=RND(0):IFT THENAR=AR+1:GOT
O814ELSEBR=BR+1
812 IFF<1+(.4-QB)THEN870ELSE818
814 IFF<1+(.4-QA)THEN870
818 GOSUB5000:GOTO850
825 PRINT"SHOT MISSED, FOUL ON R
EBOUND"
830 F=RND(2):IFF=1THEN646ELSEGOS
UB9:GOSUB9:GOSUB5000:BG=1:GOTO64
6
850 'FAST BK
851 S=1:SS=SS-RND(4)
852 PRINTO$" FAST BREAK":GOSUB9
854 GOSUB2500:IFCL=1THEN930
856 F=RND(0):OF=.7:IFF<.3THEN575
ELSE500
870 'WRAP-UP
```


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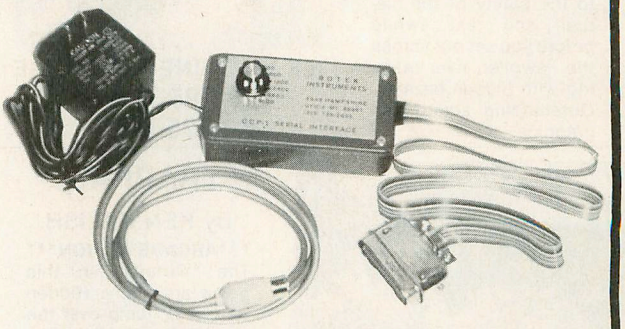

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Approaches the excitement and challenges of any Video Arcade. The hazards of CU*BER are many. Help CU*BER change the colors on the pyramid while avoiding many of the dangers always present. Vipers, the Nurd, the Dork, bonus points all add up to another exciting release from Tom Mix Software.

Arcade Action. Method of play you are the Grabber. The object is to grab the 8 treasures and store them in the center boxes. You start with 3 Grabbers and get extra ones at 20,000 points. Watch out for the googlies! Super high resolution graphics.

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Devil Assault is a multi-level multi-screen game in which bird-like creatures, robots and the devil himself assault your home base which you must defend.

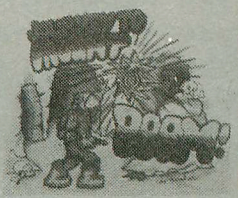
BUZZARD BAIT

By RUGBY CIRCLE
32K Machine Language
$27.95 Tape $30.95 Disk

We've done it again! You thought the King was great? wait 'till you see this!! Outstanding high resolution graphics, tremendous sound make this "Joust" type game a must for your software collection. As you fly from cloud to cloud you will enjoy sky high excitement dealing with the challenges presented to you by this newest release by Tom Mix Software.

JOURNEY TO MT. DOOM

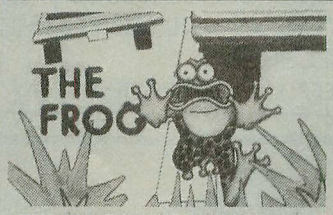
32K Mach. Lang.
$27.95 DISK ONLY



The Necromancer is about to wage war on earth. He needs his lost gold ring to acquire the power to do so. You must find the ring, take it to Mt. Doom and destroy it in the flames from which it came, thus eliminating the Necromancer's evil powers.

"THE FROG"

ARCADE ACTION
This one will give you hours of exciting play. . . Cross the busy highway to the safety of the median and rest awhile before you set out across the swollen river teaming with hidden hazards. Outstanding sound and graphics.



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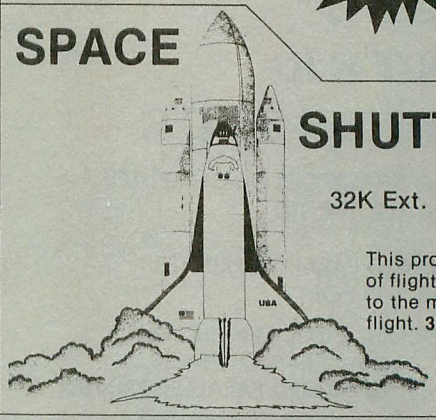
"TRAPFALL"

By KEN KALISH
ARCADE ACTION
The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

SPACE SHUTTLE



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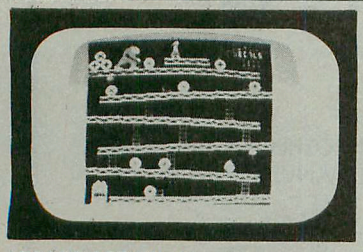

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"YAAZEE" (C) 1983 - Yaazee is a 2 player game using five dice to get the best poker hand. After game is loaded flashing digit below player number determines which player rolls dice at the start of the game. **16K Machine Language Ext. Basic** **$19.95**

BIRD ATTACK - A fast paced machine language arcade game. Shoot the birdmen before they descend upon you. Watch out for their bombs! **16K Machine Language** **$21.95**

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32K Extended Basic

$28.95 TAPE $31.95 DISK

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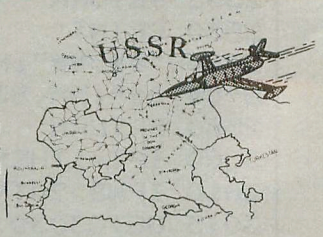

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COLOR MONITOR-Written in position independent code. (May be located in any free memory). Very compact. Only occupies 1174 bytes of memory. Full Featured. Includes Break-Pointing of machine language programs, register display and modify, memory display and modify, and block memory move commands. Displays memory in hex and ascii format on one line 8 bytes long. **MACHINE LANGUAGE $24.95**

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EDUCATIONAL SOFTWARE For The Color Computer and TDP 100

NEW

STORY PROBLEMS is a program that is designed to give practice in solving STORY PROBLEMS (sometimes called STATEMENT, THOUGHT or WORD PROBLEMS) on the COLOR COMPUTER. It is suitable for use in either a home or school environment. It is also a tool that will allow you to create new story problems to suit your children's needs and ability levels. It has many features that make it particularly attractive: Story problems involving addition, subtraction, multiplication, division or a combination of the four are presented to the student by slowly scrolling each letter of each problem onto the screen. Up to 5 students may use the program at the same time. There are 4, user modifiabale, skill levels. 16K Ext. Basic **TAPE $19.95**

SPELLING TEST is designed to give a standard oral spelling test using the audio track of the computer's tape recorder to dictate test words and sample sentences. Student responses are typed on the keyboard and checked by the computer. Results are displayed on the screen and (if connected) on a printer. **REQUIRES 16K EXT. BASIC $19.95**

MATH DRILL is a program designed to help children to practice addition, subtraction, multiplication, and division skills on the COLOR COMPUTER. It has several features that make its use particularly attractive.

- •Up to 6 students may use the program at the same time.
- •Answers for addition, subtraction and multiplication are entered from right to left, just as they are written on paper.
- •Commas may be included in the answers.
- •Partial products for the multiplication problems may be computed on the screen.
- •Division answers that have a remainder are entered as a whole number followed by the letter "R" and the remainder.
- •There are ten, user modifiable, skill levels.
- •A "SMILEY FACE" is used for motivation and reward. Its size increases relative to the skill level.
- •Skill levels automatically adjust to the student's ability.
- •A timer measures the time used to answer each problem and the total time used for a series of problems.
- •After a problem has been answered incorrectly the correct answer appears under (above in division) the incorrect answer.

REQUIRES 16K EXT BASIC $19.95

WORD DRILL is designed to give a multiple choice vocabulary quiz. Words and definitions are entered into the program from the keyboard or from a tape file. The computer displays a randomly chosen definition and eight word choices. The student must enter his response before a built in timer reaches zero.

REQUIRES 16K EXT. BASIC $19.95

EDUCATIONAL PACKAGE — SPELLING TEST — WORD DRILL — MATH DRILL — ESTIMATE — ALL FOR — $69.95

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the COLOR COMPUTER. It has many features that make its use particularly attractive:

- •Up to 5 students may use the program at the same time.
- •There are 5, user modifiable, skill levels.
- •The acceptable percent error may be changed as a student's skill improves.
- •A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- •If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- •If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- •A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- •The (BREAK) key has been disabled so that a child will not inadvertently stop the program from running.

16K EXT. BASIC $19.95

TEACHERS' DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive.

- • Information on as many as 100 students (or more) may be in the computer at one time.
- • Each student may have as many as 20 (or more) individual items of data in his/her record.
- • The program will run from cassette or disk.
- • Cassette and disk files are completely compatable.
- • The program is menu driven.
- • Records may be easily changed, deleted, combined or added.
- • Information about students may be numerical or text.
- • Records may be quickly alphabetized.
- • Records may be sorted by various criteria.
- • Records may be reordered (ranked) based on test scores or other data.
- • Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- • A full statistical analysis of data may be done and sent to the printer.
- • Student test scores may be weighted. **32K EXT BASIC TAPE $39.95 DISC $42.95**

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```
872 GOSUB5000
880 SS=SS-RND(2):GOSUB2500:IFCL
THEN930
885 GOSUB9000
888 FORN=1TO3:GOSUB9:NEXT
890 IFRB THEN180
920 IFTN=1THEN660
925 IFBG=1THEN1000ELSE1170
930 PRINT"TIME RUNS OUT":CL=0:FO
RL=1TO6:SOUND140,8:NEXT
931 IFLV$="H"THEN950
932 IFH$<>"1ST HALF"THEN936
934 H$="HALFTIME":GOTO44
936 IFS(0)<>S(1)THEN940
938 H$="OVERTIME":MM=5:GOTO44
940 H$="FINAL":GOTO44
950 IFH$="1ST QTR"THENH$="2ND QT
R":GOTO975ELSEIFH$="2ND QTR"THEN
H$="HALF":VA=0:VB=0:GOTO975ELSEI
FH$="HALF"THENH$="4TH QTR":GOTO9
75
960 IFS(0)<>S(1)THEN970
965 H$="OVERTIME":MM=3:GOTO44
970 H$="FINAL":GOTO44
975 MM=8:GOTO44
999 'PRESS
1000 BG=0:F=RND(0)
1001 PRINTD$TAB(11)"FALL BACK(1-
7)":PRINTTAB(11)"PRESS(2-8)":PRI
NTTAB(11)"GO FOR BALL(3-9)":PRIN
TTAB(11)"OR FOUL(4-0)"
1002 IFCP=2ANDT=1THEN1004
1003 IFCP>1GOSUB6100:GOTO1008
1004 FORL=1TO(DL*1.5)
1005 PN$=INKEY$:PN=VAL(PN$)
1006 IFT=1THEN1008
1007 PN=PN-6:IFPN$="0"THENPN=4
1008 IFPN>0ANDPN<5THEN1012
1009 IFCP>1ANDT=0THEN1012
1010 IFCP>2THEN1012
1011 NEXTL:GOTO1170
1012 ONPN GOTO1170,1020,1015,400
1013 GOTO1170
1015 F=RND(6):ONF GOTO1030,1170,
1170
1016 GOTO640
1020 F=RND(0):SS=SS-RND(4)
1023 IFT=0THENQ=QB/10ELSEQ=QA/10
1025 IFF+Q<.95THEN1050
1030 PRINT"BALL KNOCKED AWAY"
1035 IFT=0THENAT=AT+1ELSEBT=BT+1
1040 F=RND(2):IFF=1THEN818
1045 TN=1:GOTO870
1050 IFF>.8THEN640
1170 BG=0:SS=SS-RND(5)
1175 GOSUB2500:IFCL THEN930
1180 PRINTO$" ACROSS CENTER LINE
"
1190 GOTO180
2500 'TIME
2510 IFMM<=0ANDSS<=0THEN2530
2515 IFSS<0THEN2525
2520 GOTO2535
2525 MM=MM-1:SS=SS+60:GOTO2535
2530 MM=0:SS=0:CL=1
2535 RETURN
2550 PRINT"    ";:IFSS>9THENPRINT
USING"##:##";MM,SS ELSEPRINTUSIN
G"##:0#";MM,SS
2560 RETURN
3000 IFT=1THEN3020
3010 IFWB>20THENFF=0A ELSEFF=IA
3015 GOTO3030
3020 IFWB>20THENFF=0B ELSEFF=IB
3030 BA=(IA-((IB+IB+DB)/3))*10
3040 BB=(IB-((IA+IA+DA)/3))*10
3050 RETURN
4000 'FREE THROWS
4001 J$=INKEY$:PRINT"SEE sTATS O
R SHOOT fREE THROWS":FORL=1TO150
:F=RND(0):J$=INKEY$:IFJ$="S"THEN
4003ELSEIFJ$="F"THEN4004ELSENEXT
:GOTO4004
4003 PRINT:GOSUB69
4004 GOSUB9:F=RND(0)
4005 W=1:X=0:Y=0
4023 IFF>.75THEN4029
4025 PRINT:PRINT"FREE THROW GOOD
":SOUND200,1
4027 X=1:Y=1:BG=1:IF K<>1THEN404
0ELSE4092
4029 PRINT"FREE THROW MISSED"
4031 IFK<>2THEN4090
4040 F=RND(0):W=2
4048 IFF>.75THEN4054
4050 PRINT"2ND FREE THROW GOOD":
SOUND200,1
4052 X=X+1:Y=Y+1:BG=1:GOTO4092
4054 PRINT"2ND FREE THROW MISSED
"
4090 J=1
4092 S(T)=S(T)+Y:IFT=0THEN4096
4094 BW=BW+W:BX=BX+X:GOTO4098
4096 AW=AW+W:AX=AX+X
4098 IFJ=1THEN4105
4100 RETURN
4105 J=0:BG=0:F=RND(5)
4110 IFF=3THEN4140
4115 PRINT"REBOUND TO "D$
4120 IFD$=A$THENAR=AR+1ELSEBR=BR
+1
4125 GOTO4160
4140 PRINT"REBOUND TO "O$:RB=1
4150 IFA$=O$THENAR=AR+1ELSEBR=BR
+1
4160 GOSUB9:RETURN
5000 'CHANGE POSSESSION
5001 S$=INKEY$:XX=0
5005 IFT=0THEN5020
5010 O$=A$:T=0:TT=1:D$=B$:GOTO50
```

★ COLOR COMPUTER WORD PROCESSOR ★

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THE SECOND GENERATION WORD PROCESSOR IS NOW . . . ELITE•WORD has many new features not found in other word processors for the Color Computer. ELITE•WORD is an all machine language, high performance, Full Screen Editor which offers an ease of use that is simply incredible. ELITE•WORD also offers a printed output flexibility that can handle your sophisticated home and business applications. ELITE•WORD is waiting to work for you.

MAJOR Features include:

- **ALL Machine Language for speed**
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- **User Friendly (really)**
- **Top screen line reserved for command prompts, HELP messages, and status information**
- **Two text entry modes: Insert and Exchange**
- Edit 2 files simultaneously (OS-9 Only)
- Delete character under cursor
- Backspace and delete one character
- Delete entire screen line
- Rewrite entire screen
- Page Forward through text
- Page Backward through text
- Mark present line for automatic centering on output
- Insert new text (Insert mode)
- Type over old text (Exchange mode)
- Screen Display is 32x19 in normal text editing modes
- Screen Display is High-Res 64x19 when used to display final text; including page breaks and justification
- Screen Display in all modes is true Upper/Lower case characters with descenders
- Over 13.5K file size in 32K machines
- Continuous memory display
- Save text file (disk or tape)
- Load text file (disk or tape)
- All I/O errors trapped and recoverable
- Jump to beginning or end of text
- Find any string of characters in text
- Global replacement of one string in text for another
- **True block-text Move command**
- **Smooth cursor movement over text in any direction (including vertical)**
- **Smooth screen scroll for easier proof reading**
- **Auto Key-Repeat will automatically repeat any key that is held down**
- **Easy generation of ASCII files**
- **VIEW function permits high-res screen display of final text before it's printed; including right-side justification and page breaks**
- **VARIABLE TEXT MERGE allows for generation of standard form type letters that appear to be personally prepared for each reader**
- **INCLUDE feature (disk only) permits the inclusion of many other files within one large document. Total document will have sequential page numbering**
- **From the same minds that brought you ELITE•CALC**
- **Type ahead keyboard buffer NEVER misses a character**
- **Optional screen display of all carriage returns <cr>**
- **Fast Disk I/O . . . No loading of overlay files to slow program operation**
- **User HELP display available**
- **Automatic screen Word-Wrap; even while inserting new text**
- Block-text move, copy or delete
- Display/Change default disk drive number (disk only)
- Display disk directory (disk only)
- Display Free disk space available
- Software remembers last file name Saved or Loaded and will write to that file by default if desired
- Dynamic margin changes within text
- Select Top margin, Bottom margin, and Page length
- Choose number of duplicate copies
- Page Pause, for single sheet users, if desired
- Optional page numbering begins with any selected page number
- Printer Font codes are user definable
- All printer format options may be changed dynamically within text
- Any string of HEX characters may be imbedded within text to send any special control codes to your printer
- An Eject (top of form) command may be inserted within text
- Variable Text Merge symbols may be inserted anywhere within text
- All machine language; 32K and Extended Basic required for ROM-call routines

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```
35
5020 O$=B$:T=1:TT=0:D$=A$
5035 CQ=MM:FC=0:S=0:RA=30:DV=0
5040 GOSUB9:IFAV<9ORBV<9THENPC=.
5:GOTO5060
5050 IFT=0THENPC=AV/AU ELSEPC=BV
/BU
5060 CLS8:RETURN
6000 L=(RND(0)*.4)-.2:IFT THEN60
20
6005 IFIA<OA+L THENG=1ELSEG=2
6010 IFQB<DB-.1ANDS(1)>S(0) ANDS
(1)<S(0)+8THENG=2
6015 GOTO6050
6020 IFIB<OB+L THENG=1ELSEG=2
6025 IFQA<DA-.1ANDS(0)>S(1)ANDS(
0)<S(1)+8THENG=2
6050 IFCQ-MM>2THENG=1
6060 IFH$<>"2ND HALF"ANDH$<>"4TH
 QTR"ANDH$<>"OVERTIME"THENRETURN
6062 IFMM<5ANDS(T)>S(TT)+MM ANDS
(T)-S(TT)<20THENG=1
6065 IF2*MM<S(T)-S(TT)-1AND8+3*M
M>S(T)-S(TT)THENG=3
6070 IFMM=0ANDSS<41ANDS(T)>S(TT)
ANDS(T)-S(TT)<6THENG=3
6080 RETURN
6100 IFF<.6THENPN=1ELSEPN=2
6105 GOSUB6000:IFG=3THENPN=3
6110 RETURN
```


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```
6500 GOSUB9:L=FF:S$="":S=0:IFS(T
T)>S(T)+2THEN6520
6501 IFH$<>"2ND HALF"ANDH$<>"4TH
 QTR"ANDH$<>"OVERTIME"THEN6510
6505 IFMM<5THENIFS(T)>S(TT)ANDS(
T)-S(TT)<MM+3THENL=.6:FG=1
6510 IFMM=0ANDS(T)=>S(TT)ANDS(T)
-S(TT)<4THENL=.75:FG=1:S=3
6520 IFOF+.06>L THEN6600
6521 IFL<.7THENN=L ELSEN=L-.2
6523 IFOF>=N+(RND(0)*(L-N))THEN6
600
6525 IFFG THEN6537
6530 IFRA<9ANDRND(RA)=1THEN6600
6537 IFL=.2THEN6560ELSEIFMM=0AND
SS<9THENL=.2:GOTO6520ELSEIFFG TH
EN6560
6540 IFH$<>"2ND HALF"ANDH$<>"4TH
 QTR"ANDH$<>"OVERTIME"THEN6560
6550 IFS(TT)-S(T)>MM*2+2THENFG=1
:L=L-.1:GOTO6520
6555 IFL>.599THEN6580
6560 FG=0:IFRA<33ANDGU<1/G(TT)TH
ENS=1:RETURN
6570 IFG(TT)=1ANDRA<18THENIFRND(
3)=2THENS=1:RETURN
6580 RETURN
6600 S$=" ":S=0:RETURN
7000 'FOUL TOTE
7015 IFF$=A$THEN7050
7020 FB=FB+1:F=FB
7025 VB=VB+1
7027 PRINTB$" WITH"VB"FOULS"
7030 GOSUB7200
7032 IFF<>1THEN7080
7038 F=RND(5)
7040 PRINT"PLAYER "F" FOULS OUT"
7045 IFF<3THENOB=OB-.05ELSEIB=IB
-.05
7047 DB=DB-.05:GOTO7080
7050 FA=FA+1:F=FA
7055 VA=VA+1
7057 PRINT A$" WITH"VA"FOULS"
7060 GOSUB7200
7062 IFF<>1THEN7080
7068 F=RND(5)
7070 PRINT"PLAYER "F" FOULS OUT"
7075 IFF<3THENOA=OA-.05ELSEIA=IA
-.05
7077 DA=DA-.05
7080 IFCP>2THEN7200
7085 GOSUB9:GOSUB9
7200 IFF=20ORF=25ORF=30ORF=35ORF
=40THENF=1ELSEF=0
7202 RETURN
8000 CLS3:IFRA>29ANDRND(5-G(TT))
=3THENRA=RA+RND(6)-3:GU=RND(3):G
OTO8400
8004 ONG(TT)GOTO8200,8010,8300
8010 IFT=0THENQ=QA:D=DB:GOTO8012
```

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- Relation Operators: =,>,<,<=,>=,<>
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```
8011 Q=QB:D=DA
8012 IFRA<9THEN8020
8014 RA=RND(D*48)+(D*16)+1
8016 IFRA<17THENRA=9+RND(D*20)
8020 IFRA<14THENRA=RND(D*18)+RND
(D*18):IFRA>16THENRA=14:GOTO8020
8040 IFRA>19THENN=.7:GOTO8075
8045 IFRA>16ANDRA<20THENN=.3ELSE
N=0
8075 SS=SS-RND(2)
8100 GU=RND(0)+D+.1-N+(D-.5)
8110 GOTO8400
8200 IFT=0THENQ=QA:D=(DB+QB)/2:G
OTO8205
8201 Q=QB:D=(DA+QA)/2
8205 IFRA<10THENRA=RND(14)+(D*9)
:GOTO8240
8210 RA=RND(D*44)+(D*13)-(Q*8)
8240 GU=D+RND(0)-.1+(D-.5):GOTO8
400
8300 RA=RND(30):ST=0
8305 IFT THENQ=QB:D=DA ELSEQ=QA:
D=DB
8310 IFRA>27THENRA=RND(4):GU=0:G
OTO8400
8320 GU=RND(2)
8400 IFSS<9ANDMM=0THENSS=SS-1ELS
ESS=SS-(RND(5)+1)
8405 IFST=1THENRA=RND(19)+20:ST=
0ELSEIFRA>35THENRA=RA-9
8410 GOSUB2500:IFCL THENRETURN
8414 S$=INKEY$:GOSUB9000
8415 IFCC=1THEN8420
8416 WB=RA+RND(20):IFRA<16THENWB
=WB-7
8420 CC=0:IFWB>20THENPRINT"GUARD
 WITH BALL"ELSEPRINT"BIG MAN WIT
H BALL"
8425 IFWB>20ANDRA<11THENGU=GU+.3
8428 GOSUB3000:OF=FF
8430 IFGU>1THENGU$="GUARDED"ELSE
IFGU>.5THENGU$="OPEN"ELSEGU$="WI
DE OPEN"
8440 PRINTINT(RA+.5)"FEET AWAY,
"GU$
8450 IFWB>20THENM=20ELSEM=10
8460 IFRA<M THENOF=OF+(M-RA-5)/1
00:GOTO8470
8465 OF=OF+(M-RA-5)*2/100
8470 IFRA<4THENOF=OF+OF/2
8475 IFGU>1THENOF=OF/2
8480 IFOF<.1THENOF=.1
8485 IFOF>.9THENOF=.9
8487 IFWB<21THEN8490
8488 IFGU>1ANDRA<9THENOF=OF-.1
8490 PRINT:PRINT"PRESS<SPACE> TO
 SHOOT"
8491 PRINT"  (1-7) TO DRIVE":PRI
NT"  (2-8) TO STALL":PRINT"  (3-
9) TO PASS":PRINT
8492 IFCP=1THEN8500
8494 IFCP=2ANDT=0THEN8500
8495 GOSUB6500:GOTO8513
8500 FORL=1TO(DL*1.5)
8510 S$=INKEY$:S=VAL(S$)
8512 IFS=3ORS=9THEN8530
8513 IFS>0THEN8600
8515 IFS$=" "THEN8540
8517 IFCP>2THEN8525
8518 IFCP=2ANDT=1THEN8525
8520 NEXTL
8521 GOTO8530
8525 GOSUB9
8530 DV=0:IFGF=1THEN245
8535 IFST=1THEN510
8540 RETURN
8600 IFS>5THENS=S-6
8605 CC=1:IFS=1THENPRINT"DRIVE":
GOSUB9:GOTO8620
8610 PRINT"STALL":GOSUB9:ST=1:GO
TO8535
8620 IFGU>1THEN8650
8640 X=(Q*8)-(D*8)+RND(5)+(RA/8)
8647 RA=RA-X:GOTO8651
8650 RA=RA-RND(2)+RND(2)
8651 IFRA<8THENDV=DV+1:IFDV>4THE
N8540
8652 IFRA<3THENRA=1+RND(D*8):GU=
GU+.3
8653 GU=GU+(D/1.7)-(RND(0)*(Q/2)
):IFG(TT)=2ANDRA<25THENGU=GU+D
8654 F=RND(0)*8:IFF<(1-D)ANDG(TT
)=1THENGU=D+.2
8655 F=RND(0):IFF<(1-Q)/40THENPR
INT"DOUBLE DRIBBLE":GOTO706
8658 IFF>1-(Q/40)THEN675
8660 SS=SS-RND(3)
8665 CLS3:GOTO8410
9000 PRINTO$" WITH THE BALL"
9001 PRINT"DEFENSE:  "Z$(TT)
9005 IFMM<E ANDCP=4THENCP=Z:PRIN
T"TIME TO SWITCH MODES","PRESS e
nter TO CONTINUE":INPUTJ$:CLS3:G
OTO9000
9010 GOSUB2550
9040 PRINTA$"--"S(0):PRINTB$"--"
S(1):PRINT
9060 RETURN
9500 INPUT"PRINT STATS(Y,N)";Q$:
IFQ$="N"THENENDELSEIFQ$<>"Y"THEN
9500
9510 CLS:PR=1:GOSUB60:M=1087
9520 FORI=3TO14:FORL=0TO31
9530 M=M+1:X=PEEK(M):IFX>95THENX
=X-64
9540 IFX<32THENX=X+64
9550 PRINT#-2,CHR$(X);:NEXTL:PRI
NT#-2,CHR$(13);:NEXTI
9560 FORL=0TO9:PRINT#-2,CHR$(13)
:NEXT:GOTO9500
```

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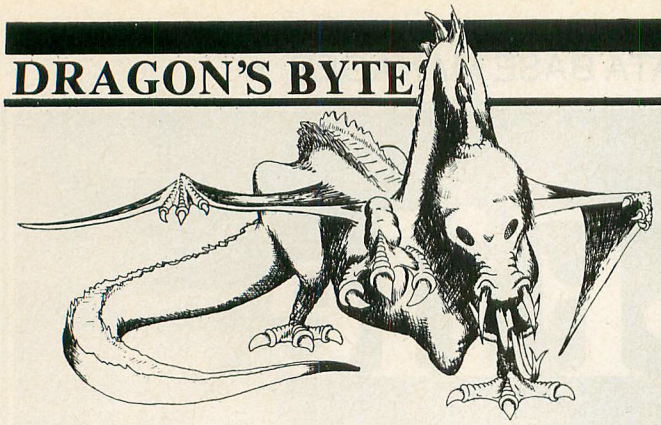

A Complete Character Generator

In the fantasyland of magazine publishing, a columnist becomes trapped in a time warp that serves up a St. Valentine's Day turkey, compresses a contest, and causes dragons and other unlikely characters of old to pour forth from a 20th century machine.

By Bill Nolan
Rainbow Contributing Editor

Welcome to Fantasyland! As you know, there is a contest going on in this column to design spells and monsters for the new fantasy roleplaying game we are creating. The response so far has been excellent, with several really good entries, and we will be announcing the winners in next month's column. If you haven't already entered, it is probably too late now, but if you want to give it a try the rules and prizes are in last month's issue. The reason it's too late is called lead time, and I never appreciated it until lately. The cover of this magazine may say "February," but as I sit here at my trusty CoCo pecking out these immortal words in an effort to beat my deadline, my calendar says that Thanksgiving is just a few days in the future. If sometimes we don't seem as timely as you would like, that is the reason.

This month we are digressing for a bit. A lot of people have written me and asked for a *complete* character generator program to use with Dungeons and Dragons, and so I decided that I would provide the one I use myself. This is a complete package, and lets you create a character that includes basic scores, race, class (or classes), sex, age, height, weight, thieving abilities, clerical spell bonuses, and hit points. Try it out a few times, and I think you will be pleasantly surprised by the accuracy and attention to detail.

By the way, this program rolls up characters for use with fantasy roleplaying games. It isn't a game itself. I say that because lots of people have typed in one of my programs and then called or written to say that they didn't understand how to get the game to start.

Next month we will have the winners in the monsters and spells contest, and we will also continue with the development of our new game — really, I promise. So, until then, you have a nice St. Valentine's day, and I'll go pick out a turkey. I sure am glad I don't really have to take my trusty sword Doomspeaker out and slay my own turkey again this year, but that's another story.

(Bill Nolan and his wife Sara operate Prickly-Pear Software. Bill also teaches computer science at a local college and is DM at a regular weekly fantasy game.)

Rainbow Check Plus

20	0438	117
33	0713	242
45	0953	37
66	0C74	240
81	0E76	242
96	10C8	58
109	12B6	119
127	1541	121
139	170B	157
155	18AE	222
168	1AF2	99
186	1CDE	0
200	1ED0	171
218	21D8	187
231	23DE	66
END	26C3	111

The listing:

```
1 '*****CHARACTER GENERATOR*****
2 '********COPYRIGHT 1982*******
3 '****PRICKLY-PEAR SOFTWARE****
4 CLEAR:DIMC(6),C$(11,2),R$(7,2)
,MC(3,1),DA(17,7),D(10)
8 GOSUB199:CLS:PRINT@34,"STRENGT
H --------":PRINT@52,ST:IFES=1THE
NPRINT@56,"/";ER
9 PRINT@98,"INTELLIGENCE ---":PR
INT@116,IN:PRINT@162,"WISDOM ---
-------":PRINT@180,WI:PRINT@226,"
DEXTERITY ------":PRINT@244,DX:P
RINT@290,"CONSTITUTION ---":PRIN
T@308,CN:PRINT@354,"CHARISMA ---
-----":PRINT@372,CH
10 PRINT@419,"RECORD THESE IF OK
 AND HIT":PRINT@450,"'C' TO GO O
```

```
N - 'R' TO RE-ROLL";
11 K$=INKEY$:IFK$=""THEN11ELSESO
UND150,1
12 IFK$<>"C"ANDK$<>"R"THEN11ELSE
IFK$="R"THEN8
13 CLS:GOSUB34:GOSUB62
14 CLS:C$(1,2)="CLERIC":IF(R<>6)
ANDIN>5ANDST>5ANDCN>5ANDCH>5ANDW
I>8THENC$(1,1)="Y"
15 C$(2,2)="DRUID":IF(R<>2)AND(R
<>3)AND(R<>4)AND(R<>7)ANDIN>5AND
ST>5ANDDX>5ANDCN>5ANDWI>11ANDCH>
14THENC$(2,1)="Y"
16 C$(3,2)="FIGHTER":IFST>8ANDCN
>6ANDWI>5ANDDX>5ANDCH>5THENC$(3,
1)="Y"
17 C$(4,2)="PALADIN":IF(R=1)ANDD
X>5ANDST>11ANDIN>8ANDWI>12ANDCN>
8ANDCH>16THENC$(4,1)="Y"
18 C$(5,2)="RANGER":IF(R=10RR=5)
ANDDX>5ANDCH>5ANDST>12ANDIN>12AN
DWI>13ANDCN>13THENC$(5,1)="Y"
19 C$(6,2)="MAGIC-USER":IF(R=10R
R=30RR=5)ANDWI>5ANDCN>5ANDCH>5AN
DIN>8ANDDX>6THENC$(6,1)="Y"
20 C$(7,2)="ILLUSIONIST":IF(R=10
RR=4)ANDST>5ANDWI>5ANDCH>5ANDIN>
14ANDDX>15THENC$(7,1)="Y"
21 C$(8,2)="THIEF":IFST>5ANDIN>5
ANDCN>5ANDCH>5ANDDX>8THENC$(8,1)
="Y"
22 C$(9,2)="ASSASSIN":IF(R<>6)AN
DWI>5ANDCN>5ANDST>11ANDIN>10ANDD
X>11THENC$(9,1)="Y"
23 C$(10,2)="MONK":IF(R=1)ANDIN>
5ANDCH>5ANDST>14ANDWI>14ANDDX>14
ANDCN>10THENC$(10,1)="Y"
24 FORX=1TO10:IFC$(X,1)="Y"THENC
X=CX+1
25 NEXTX:IFCX=0THENPRINT"THESE S
CORES QUALIFY FOR NOTHING":FORX=
1TO1000:NEXTX:GOTO8
26 C$(11,2)="MULTI-CLASSED":IFCX
>1ANDR<>1THENC$(11,1)="Y"
27 PRINT"THIS CHARACTER QUALIFIE
S TO BE:":PRINT:FORX=1TO11:IFC$(
X,1)="Y"THENPRINT"          ";:PRIN
TUSING"##.";X;:PRINT"  ";C$(X,2)
28 NEXTX:PRINT:INPUT"          ente
r YOUR CHOICE";CL$:SOUND150,1:MC
(1,0)=VAL(CL$):C=MC(1,0):IFC$(MC
(1,0),1)<>"Y"THENPRINT" enter a
number shown":FORX=1TO1000:NEXTX
:CLS:GOTO27
29 IFMC(1,0)=11THENGOTO185
30 CL$=C$(MC(1,0),2):NC=1
31 Y=0:FORX=1TONC:IFMC(X,0)=3ORM
C(X,0)=4ORMC(X,0)=5THENY=Y+1
32 NEXTX:IFY=0ANDES=1THENES=0:ER
=0
33 GOTO66
34 PRINT" THESE SCORES QUALIFY T
O BE A:":R$(1,2)="HUMAN":R$(1,1)
="Y":R$(2,2)="DWARF":IF(ST>7)AND
(CN>10)AND(CH>4)THENR$(2,1)="Y"
35 R$(3,2)="ELF":IF(IN>7)AND(DX>
5)AND(CN>6)AND(CH>7)THENR$(3,1)=
"Y"
36 R$(4,2)="GNOME":IF(ST>5)AND(I
N>6)AND(CN>7)THENR$(4,1)="Y"
37 R$(5,2)="HALF-ELF":IF(IN>3)AN
D(DX>5)AND(CN>5)THENR$(5,1)="Y"
38 R$(6,2)="HALFLING":IF(ST>6)AN
D(IN>5)AND(DX>6)AND(CN>9)THENR$(
6,1)="Y"
39 R$(7,2)="HALF-ORC":IF(ST>4)AN
D(CN>11)THENR$(7,1)="Y"
40 PRINT:FORX=1TO7:IFR$(X,1)="Y"
THENPRINT"          ";:PRINTUSING"#
#.";X;:PRINT"  ";R$(X,2)
41 NEXTX
42 K$=INKEY$:IFK$=""THEN42
43 SOUND150,1:R=VAL(K$):IFR$(R,1
)<>"Y"THEN42
44 ONR GOTO45,46,49,50,51,52,55
45 R$="HUMAN":RETURN
46 R$="DWARF":CN=CN+1:CH=CH-1:IF
DX>17THENDX=17
47 IFCH>16THENCH=16
48 RETURN
49 R$="ELF":DX=DX+1:CN=CN-1:RETU
RN
50 R$="GNOME":RETURN
51 R$="HALF-ELF":RETURN
52 R$="HALFLING":ST=ST-1:ES=0:ER
=0:DX=DX+1:IFWI>17THENWI=17
53 IFDX>18THENDX=18
54 RETURN
55 R$="HALF-ORC":ST=ST+1:CN=CN+1
:CH=CH-2:IFIN>17THENIN=17
56 IFWI>14THENW=14
57 IFDX>14THENDX=14
58 IFCH>12THENCH=12
59 IFST>18THENST=18:GOTO61
60 IFST=18THENER=RND(100):ES=1
61 RETURN
62 CLS:PRINT@34,"STRENGTH ------
-":PRINT@52,ST:IFES=1THENPRINT@5
6,"/";ER
63 PRINT@98,"INTELLIGENCE ---":P
RINT@116,IN:PRINT@162,"WISDOM --
-------":PRINT@180,WI:PRINT@226,
"DEXTERITY ------":PRINT@244,DX:
PRINT@290,"CONSTITUTION ---":PRI
NT@308,CN:PRINT@354,"CHARISMA --
------":PRINT@372,CH
64 PRINT:PRINT" RECORD THESE NEW
 RACE-ADJUSTED":PRINT"    VALUES
, THEN HIT ANY KEY"
65 K$=INKEY$:IFK$=""THEN65ELSESO
```

```
UND150,1:RETURN
66 CLS:PRINT:PRINT"  enter THE L
EVEL AS -":FORX=1TONC:PRINT:PRIN
T"  ";C$(MC(X,0),2);:INPUTL$:MC(
X,1)=VAL(L$):SOUND150,1:NEXTX
67 PRINT:PRINT"  enter THIS ";R$
(R,2);"'S SEX."
68 PRINT"  HIT 'F' OR 'M' PLEASE
."
69 S$=INKEY$:IFS$=""THEN69ELSESO
UND150,1
70 IFS$<>"F"ANDS$<>"M"THEN69ELSE
IFS$="F"THENS$="FEMALE"ELSES$="M
ALE"
71 PRINT:PRINT"  enter THE NAME"
:PRINT"  ";:INPUTN$
72 CLS:ONCN GOTO73,73,73,74,74,7
4,75,75,75,75,75,75,75,75,76,77,
78,78,78
73 CB=-2:GOTO81
74 CB=-1:GOTO81
75 GOTO81
76 CB=1:GOTO81
77 CB=2:GOTO81
78 FORX=1TONC:IFMC(X,0)=3ORMC(X,
0)=4ORMC(X,0)=5THENGOTO80
79 NEXTX:CB=2:GOTO81
80 IFCN=17THENCB=3ELSEIFCN=18THE
NCB=4ELSEIFCN=19THENCB=5
81 D(1)=8:D(2)=8:D(3)=10:D(4)=10
:D(5)=8:D(6)=4:D(7)=4:D(8)=6:D(9
)=6:D(10)=4
82 FORZ=1TONC:PRINT"  ";C$(MC(Z,
0),2);:IFMC(Z,0)=5ORMC(Z,0)=10TH
ENL=MC(Z,1)+1ELSEL=MC(Z,1)
83 FORY=1TOL:RP=RND(D(MC(Z,0))):
PRINTRP;:IFMC(Z,0)=3ORMC(Z,0)=4O
RMC(Z,0)=5THEN86
84 IFCB>2THENRP=RP+2ELSERP=RP+CB
85 GOTO87
86 RP=RP+CB
87 HP=HP+RP:NEXTY:PRINT:NEXTZ:HP
=HP/NC
88 PRINT"  CONSTITUTION BONUS ="
;CB
89 PRINT"  HIT POINTS =";HP
90 IFINT(HP)=HP THEN93ELSEPRINT"
  ROUND UP OR DOWN? (U/D)"
91 K$=INKEY$:IFK$=""THEN91ELSESO
UND150,1:IFK$<>"U"ANDK$<>"D"THEN
91ELSEIFK$="D"THENHP=INT(HP)ELSE
HP=INT(HP)+1
92 GOTO89
93 PRINT:PRINT" RECORD THIS, THE
N HIT ANY KEY"
94 K$=INKEY$:IFK$=""THEN94ELSESO
UND150,1
95 CLS:C7=MC(1,0):C8=MC(2,0):C9=
MC(3,0):IFC=11THENGOSUB163:GOTO1
25
96 AC=MC(1,0):ONR GOTO97,104,107
,111,115,119,122
97 IFAC=1ORAC=2ORAC=8THENAG=18+R
ND(4):GOTO125
98 IFAC=3THENAG=15+RND(4):GOTO12
5
99 IFAC=4THENAG=17+RND(4):GOTO12
5
100 IFAC=5ORAC=9THENAG=20+RND(4)
:GOTO125
101 IFAC=6THENAG=24+RND(8)+RND(8
):GOTO125
102 IFAC=7THENAG=30+RND(6):GOTO1
25
103 AG=21+RND(4):GOTO125
104 IFAC=1THENAG=250+RND(20)+RND
(20):GOTO125
105 IFAC=3THENAG=40+RND(4)+RND(4
)+RND(4)+RND(4)+RND(4):GOTO125
106 AG=75+RND(6)+RND(6)+RND(6):G
OTO125
107 IFAC=1THENFORX=1TO10:A=RND(1
0):AG=AG+A:NEXTX:AG=AG+500:GOTO1
25
108 IFAC=3THENAG=130+RND(6)+RND(
6)+RND(6)+RND(6)+RND(6):GOTO125
109 IFAC=6THENAG=150+RND(6)+RND(
6)+RND(6)+RND(6)+RND(6):GOTO125
110 AG=50+RND(6)+RND(6)+RND(6)+R
ND(6)+RND(6):GOTO125
111 IFAC=1THENAG=300+RND(12)+RND
(12)+RND(12):GOTO125
112 IFAC=3THENAG=60+RND(4)+RND(4
)+RND(4)+RND(4)+RND(4):GOTO125
113 IFAC=7THENAG=100+RND(12)+RND
(12):GOTO125
114 AG=80+RND(4)+RND(4)+RND(4)+R
ND(4)+RND(4):GOTO125
115 IFAC=1ORAC=2THENAG=40+RND(4)
+RND(4):GOTO125
116 IFAC=3ORAC=5THENAG=22+RND(4)
+RND(4)+RND(4):GOTO125
117 IFAC=6THENAG=30+RND(8)+RND(8
):GOTO125
118 AG=22+RND(8)+RND(8)+RND(8):G
OTO125
119 IFAC=1THENAG=80+RND(12):GOTO
125
120 IFAC=3THENAG=20+RND(4)+RND(4
)+RND(4):GOTO125
121 AG=40+RND(4)+RND(4):GOTO125
122 IFAC=1THENAG=20+RND(4):GOTO1
25
123 IFAC=3THENAG=13+RND(4):GOTO1
25
124 AG=20+RND(4)+RND(4)
125 PRINT:PRINT" THE AGE IS: ";A
G
126 ONR GOTO127,128,129,130,131,
132,133
```

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```
127 HT=68+RND(8):WT=167+RND(16):
GOTO134
128 HT=45+RND(6):WT=142+RND(16):
GOTO134
129 HT=56+RND(8):WT=96+RND(8):GO
TO134
130 HT=39+RND(6):WT=76+RND(8):GO
TO134
131 HT=62+RND(8):WT=122+RND(16):
GOTO134
132 HT=33+RND(6):WT=56+RND(8):GO
TO134
133 HT=62+RND(8):WT=142+RND(16)
134 PRINT:PRINT" THE HEIGHT IS";
HT:PRINT:PRINT" THE WEIGHT IS";W
T:PRINT:PRINT" RECORD THESE VALU
ES, THEN"
135 PRINT" HIT ANY KEY TO CONTIN
UE"
136 K$=INKEY$:IFK$=""THEN136ELSE
SOUND150,1
137 IFC7=8ORC8=8ORC9=8THEN141
138 IF(C7=9ANDMC(1,1)>2)OR(C8=9A
NDMC(2,1)>2)OR(C9=9ANDMC(3,1)>2)
THEN141
139 IFC7=10ORC8=10ORC9=10THEN141
140 GOTO142
141 GOSUB206
142 CLS:Y=0:FORX=1TONC:IFMC(X,0)
=1THENY=Y+1
143 NEXTX:IFY=0THEN155
144 IFWI<13THEN155
145 PRINT"     **CLERIC SPELL BON
US**":PRINT:W9=WI-12:ONW9 GOTO15
1,150,149,148,147,146
146 PRINT" 1 FOURTH LEVEL"
147 PRINT" 1 THIRD LEVEL"
148 PRINT" 1 SECOND LEVEL"
149 PRINT" 1 SECOND LEVEL"
150 PRINT" 1 FIRST LEVEL"
151 PRINT" 1 FIRST LEVEL
152 PRINT:PRINT"  ALL ARE CUMULA
TIVE"
153 PRINT:PRINT"  RECORD THIS IN
FORMATION,":PRINT"  THEN HIT ANY
 KEY."
154 K$=INKEY$:IFK$=""THEN154ELSE
SOUND150,1
155 CLS
156 PRINT" THIS CONCLUDES THE GE
NERATION":PRINT" OF THIS CHARACT
ER"
157 PRINT:PRINT" ";N$:PRINT" ";R
$:PRINT" ";CL$:PRINT" LEVEL(S) "
;:FORX=1TONC:PRINT" -";:PRINTMC(
X,1);" ";:NEXTX:PRINT
158 PRINT" HIT POINTS =";HP:PRIN
T" AGE =";AG;"  HEIGHT =";HT:PRI
NT" WT. =";WT;" STR. =";ST;:IFES
=1THENPRINT"/";ER ELSEPRINT
159 PRINT" INTEL. =";IN;"  WISDO
M =";WI:PRINT" DEX. =";DX;"  CON
ST. =";CN:PRINT" CHARISMA =";CH;
"  SEX = ";S$
160 PRINT@480,"HIT ANY KEY";:K$=
INKEY$
161 K$=INKEY$:IFK$=""THEN161ELSE
SOUND150,1:GOTO 4
163 ONR GOTO164,164,167,171,175,
179,182
164 IFC7=1ORC8=1ORC9=1THENAG=290
:RETURN
165 IFC7=8ORC7=9ORC8=8ORC8=9ORC9
=8ORC9=9THENAG=93:RETURN
166 AG=60:RETURN
167 IFC7=1ORC8=1ORC9=1THENAG=600
:RETURN
168 IFC7=6ORC8=6ORC9=6THENAG=180
:RETURN
169 IFC7=3ORC8=3ORC9=3THENAG=160
:RETURN
170 AG=80:RETURN
171 IFC7=1ORC8=1ORC9=1THENAG=336
:RETURN
172 IFC7=7ORC8=7ORC9=7THENAG=124
:RETURN
173 IFC7=8ORC7=9ORC8=8ORC8=9ORC9
=8ORC9=9THENAG=100:RETURN
174 AG=80:RETURN
175 IFC7=1ORC7=2ORC8=1ORC8=2ORC9
=1ORC9=2THENAG=48:RETURN
176 IFC7=6ORC8=6ORC9=6THENAG=46:
RETURN
177 IFC7=8ORC7=9ORC8=8ORC8=9ORC9
=8ORC9=9THENAG=46:RETURN
178 AG=34:RETURN
179 IFC7=2ORC8=2ORC9=2THENAG=92:
RETURN
180 IFC7=8ORC8=8ORC9=8THENAG=48:
RETURN
181 AG=32:RETURN
182 IFC7=8ORC7=9ORC8=8ORC8=9ORC9
=8ORC9=9THENAG=28:RETURN
183 IFC7=1ORC8=1ORC9=1THENAG=24:
RETURN
184 AG=17:RETURN
185 PRINT"       HOW MANY CLASSES
```


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```
?"
186 K$=INKEY$:IFK$=""THEN186ELSE
SOUND150,1
187 NC=VAL(K$):IFNC<2ORNC>CX ORN
C>3THEN186
188 FORX=1TONC
189 PRINT@449,"     ENTER CLASS #
";X
190 K$=INKEY$:IFK$=""THEN190ELSE
SOUND150,1
191 MC(X,0)=VAL(K$):IFC$(MC(X,0)
,1)<>"Y"THEN190
192 IFX=1THEN197
193 ONX GOTO197,194,195
194 IFMC(X,0)=MC(1,0)THEN189ELSE
196
195 IFMC(X,0)=MC(1,0)ORMC(X,0)=M
C(2,0)THEN189ELSE196
196 CL$=CL$+"/"+C$(MC(X,0),2):GO
TO198
197 CL$=C$(MC(X,0),2)
198 PRINT@470,"*";MC(X,0);"*":FO
RXX=1TO500:NEXTXX:SOUND150,1:NEX
TX:GOTO66
199 FORC=1TO6:C(C)=0:ES=0:ER=0:F
ORC=1TO6:D1=RND(6):D2=RND(6):D3=
RND(6):D4=RND(6)
200 IF(D1=<D2)AND(D1=<D3)AND(D1=
<D4)THENC(C)=D2+D3+D4:GOTO204
201 IF(D2=<D1)AND(D2=<D3)AND(D2=
<D4)THENC(C)=D1+D3+D4:GOTO204
202 IF(D3=<D1)AND(D3=<D2)AND(D3=
<D4)THENC(C)=D1+D2+D4:GOTO204
203 C(C)=D1+D2+D3
204 NEXTC:ST=C(1):IN=C(2):WI=C(3
):DX=C(4):CN=C(5):CH=C(6):IFST=1
8THENES=1:ER=RND(100)
205 RETURN
206 IFMC(1,0)=10THENL=MC(1,1):GO
TO211
207 FORX=1TONC:IFMC(X,0)=8THENL1
=MC(X,1):GOTO210
208 NEXTX:FORX=1TONC:IFMC(X,0)=9
THENL2=(MC(X,1)-2):GOTO210
209 NEXTX
210 IFL1>L2 THENL=L1 ELSEL=L2
211 CLS:PRINT"        ***JUST A MO
MENT***":FORX=1TO17:FORY=0TO7:RE
ADDA(X,Y):NEXTY:NEXTX
212 PP=DA(L,0):OL=DA(L,1):FT=DA(
L,2):MS=DA(L,3):HS=DA(L,4):HN=DA
(L,5):CW=DA(L,6):RL=DA(L,7)
213 D=DX:IFD>18THEND=18
214 D=D-8:OND GOSUB222,223,224,2
25,226,226,226,227,228,229
215 ONR GOSUB226,216,217,218,219
,220,221:GOTO230
216 OL=OL+10:FT=FT+15:CW=CW-10:R
L=RL-5:RETURN
217 PP=PP+5:OL=OL-5:MS=MS+5:HS=H
S+10:HN=HN+5:RETURN
218 OL=OL+5:FT=FT+10:MS=MS+5:HS=
HS+5:HN=HN+10:CW=CW-15:RETURN
219 PP=PP+10:HS=HS+5:RETURN
220 PP=PP+5:OL=OL+5:FT=FT+5:MS=M
S+10:HS=HS+15:HN=HN+5:CW=CW-15:R
L=RL-5:RETURN
221 PP=PP-5:OL=OL+5:FT=FT+5:HN=H
N+5:CW=CW+5:RL=RL-10:RETURN
222 PP=PP-15:OL=OL-10:FT=FT-10:M
S=MS-20:HS=HS-10:RETURN
223 PP=PP-10:OL=OL-5:FT=FT-10:MS
=MS-15:HS=HS-5:RETURN
224 PP=PP-5:FT=FT-5:MS=MS-10:RET
URN
225 MS=MS-5:RETURN
226 RET
226 RETURN
227 OL=OL+5:RETURN
228 PP=PP+5:OL=OL+10:MS=MS+5:HS=
HS+5:RETURN
229 PP=PP+10:OL=OL+15:FT=FT+5:MS
=MS+10:HS=HS+10:RETURN
230 CLS:PRINT@5,"**THIEVING ABIL
ITIES**";:IFMC(1,0)<>10THENPRINT
@67,"PICK POCKETS ----  ";PP
231 PRINT@99,"OPEN LOCKS ------
 ";OL
232 PRINT@131,"FIND TRAPS ------
  ";FT
233 PRINT@163,"MOVE SILENTLY ---
  ";MS
234 PRINT@195,"HIDE IN SHADOWS -
  ";HS
235 PRINT@227,"HEAR NOISE ------
  ";HN
236 PRINT@259,"CLIMB WALLS -----
  ";CW
237 IFMC(1,0)<>10THENPRINT@291,"
READ LANGUAGES --  ";RL
238 PRINT@353,"RECORD THESE, THE
N HIT ANY KEY";
239 K$=INKEY$:IFK$=""THEN239ELSE
SOUND150,1:RETURN
240 DATA 30,25,20,15,10,10,85,0,
35,29,25,21,15,10,86,0,40,33,30,
27,20,15,87,0,45,37,35,33,25,15,
88,20,50,42,40,40,31,20,90,25,55
,47,45,47,37,20,92,30,60,52,50,5
5,43,25,94,35
241 DATA 65,57,55,62,49,25,96,40
,70,62,60,70,56,30,98,45,80,67,6
5,78,63,30,99,50,90,72,70,86,70,
35,99.1,55,100,77,75,94,77,35,99
.2,60,105,82,80,99,85,40,99.3,65
,110,87,85,99,93,40,99.4,70,115,
92,90,99,99,50,99.5,75
242 DATA 125,97,95,99,99,50,99.6
,80,125,99,99,99,99,55,99.7,80
```

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HARDWARE PROJECT

Cheapstick — A Smooth, Rugged Joystick For Less Than $10

By J.D. German

If your Color Computer joysticks have as many miles on them as mine do, they probably suffer from the same malady — mechanical backlash caused by wear and stretching of the plastic guides inside the mechanism. Backlash is the name engineers give to looseness or play between moving parts, and is a major design problem in mechanisms like steering systems, radio tuning dials, and gear systems. In your joystick, backlash makes playing those high resolution arcade games a very frustrating experience, because you cannot get the fine control you need. Until now, the solution has been to buy a new set of Radio Shack joysticks every 100,000 alien spacecraft or so, or to spend $40 to $60 for a joystick based on a high-quality mechanism like those used in radio control transmitters. But, if you are moderately handy with a drill and a soldering iron, and you have an hour to spare, you can make a smooth, accurate joystick for less than $10.

All the parts you will need for this joystick (which I call *Cheapstick* for obvious reasons) come from the same people who sold you your old, worn out joystick; Radio Shack. Unfortunately (for us), Radio Shack does not sell the joystick plugs or cables. But if you are building your *Cheapstick* as a replacement for a worn out joystick, you can use the cable from it. If not, you might have some luck finding a plug at a local electronic parts store. Ask for a five pin male DIN connector with a 240 degree pin spread. You may wish to take your old one along to be sure of a match.

All of the other parts you will need, along with the Radio Shack part numbers, are shown on the parts list. The total price for these parts as listed in the latest Radio Shack catalog is $8.52. If you want to substitute parts from your junkbox or a source other than Radio Shack, any joystick mechanism with 100K potentiometers, any normally-open momentary contact switch, and any box that will hold them both will do.

To prepare the box for mounting the joystick and switch, you will need to make two holes in the box and five holes in the cover. The holes in the box are for the cable and the switch, and are located as shown in Figure 1. These locations were selected on the basis of my own personal preference and could easily be changed to suit yours. The holes in the cover are laid out as shown in Figure 2. The large hole can be made easily with a ⅞ inch round chassis punch, but a large drilled hole followed by some fancy work with a file will also do the job. If you use the file method, trace the ⅞ inch circle onto the aluminum cover with carbon paper so you will know when to quit filing.

After you have finished making the holes, you are ready to install the cable; but a word of caution here. If you are using the cable from an old joystick, cut off the portion that was inside the joystick box. The cable is often damaged by flexing at the point of entry, causing an intermittent open circuit in one or more of the wires. Before installing the cable, strip the sheath from the last three inches of the loose end, but be careful not to cut the insulation on any of the wires just beneath the sheath. Then strip the insulation from the last ¼ inch of the five wires and tin them by briefly heating them with a soldering iron while applying a little solder. Finally, install one of the small strain-relief bushings four inches from the cable end and push the bushing into the cable hole in the box. The large end of this bushing goes on the outside of the box. The last step before wiring the joystick is to mount the switch in its hole with the hardware provided.

The new joystick, with its all-metal mechanism and wide stop collar, is a great improvement over the old Color Computer joystick and should withstand many times the abuse without developing backlash. The wiring is quite simple if you follow the drawing in Figure 3. First, solder the white and black jumper wires in place from pot terminals V1 to H3 and from H1 to V3, and then solder a 2-inch long black wire to terminal V1. You can use pieces of wire from the cut off end of the old cable for this if you avoid the sections that were pinched where they enter the box. Finally, solder the five wires from the cable to the pot and switch terminals as shown, and solder the black wire from terminal V1 to the other switch terminal. Be sure to follow the wire color coding shown in the figure or your pac clone will become very confused, and there are some wrong connections that could damage the power supply in your computer.

After you attach the joystick mechanism to the box cover and put the cover on the box, you are ready for a test flight. Since the new mechanism is so smooth, it will take you a game or so to get used to it, but once you do, your scores,

(J.D. German, a private consultant, has authored several educational programs which are marketed through his consulting firm, Creative Technical Consultants. He has degrees in physics and electrical engineering and is a former associate professor at the U.S. Air Force Academy.)

and your enjoyment, should reach new highs.

If you would like to simplify the construction of your *Cheapstick*, you can order a complete pre-drilled and punched kit including cable and instructions for $14.95 from Creative Technical Consultants, P.O. Box 652, Cedar Crest, NM 87008.

Parts List

Part	Radio Shack P/N	Price
Experimenter Box	270-231	$1.69
100K Joystick Pot	271-1705	4.95
Switch, N.O. Momentary Contact	275-1566	1.19
Strain Relief Bushings	278-1636	.69
Plug, 5 pin, 240° DIN	These items are not available from Radio Shack. Use parts from old joystick or find at other electronics parts store.	
Cable, 5 cond. #22 insulated wire		

All the above items may be purchased in kit form with instructions from Creative Technical Consultants, P.O. Box 652, Cedar Crest, NM 87008. Price: $14.95, shipping and handling included.

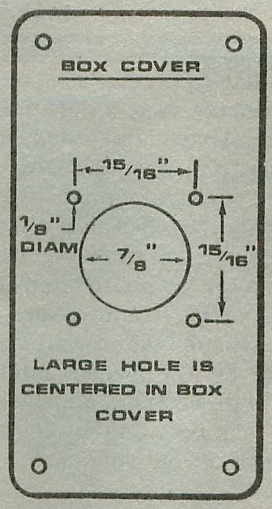

Figure 1

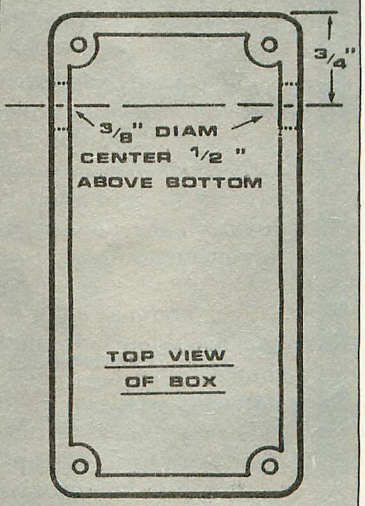

Figure 2

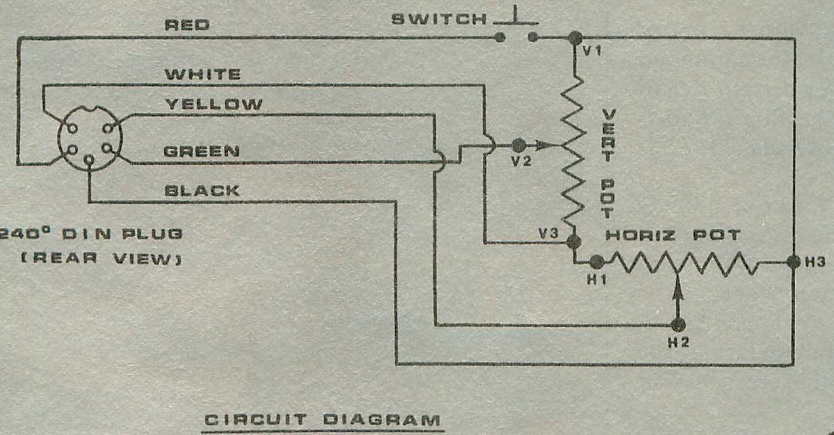

Figure 4

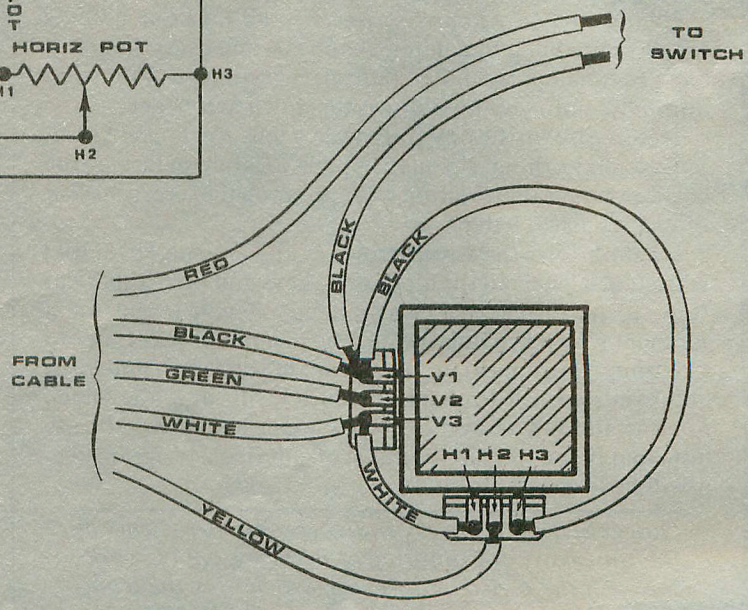

Figure 3

MULTIPLY YOUR EFFORTS WITH THIS KEYBOARD SHORTHAND

BY ROGER SCHRAG

This month I would like to present a simple assembly language utility to make your BASIC programming just a little bit easier. Are you interested? It will work on any Color Computer with at least 4K. Disk drives and Extended Color BASIC are strictly optional.

Introducing Keyboard Shorthand. This is a short routine that you load in from tape or disk when you first turn on your computer. It modifies the keyboard control system so that each of the alphabetic keys A to Z has a special abbreviation. To invoke that particular abbreviation, just hold down the arrow key and hit the proper letter key. For example, holding down the down arrow and pressing G will cause the word GOSUB to appear on the screen. This will have the exact same effect as pressing each of the keys individually: G-O-S-U-B.

Each of the 26 alphabetic keys has one such abbreviation, and you may easily redefine them however you like. (We'll talk more about that later.) So, writing a BASIC program with *Keyboard Shorthand* becomes quicker because you have to hit a lot fewer keys. Also, you will be able to cut down on the number of errors due to misspelled BASIC statements.

The source code for *Keyboard Shorthand* is shown in the listing. You may enter it on any standard editor assembler package, such as Radio Shack's *EDTASM+*. The code as shown is for a 32K system. If you have 16K, change the ORG statement to $3E00. If you have 4K, change it to $E00.

Once you have finished entering the source code, check your work for typographical errors. Then assemble it onto tape or disk. Finally, save the source code to tape or disk as well. This is done just in case you ever wish to make any modifications at some time in the future.

Now, you are ready to program in BASIC with *Keyboard Shorthand.* Turn on your computer and enter the command *CLEAR 200,32256.* This tells BASIC to leave a certain area of memory alone. This area will be used by *Keyboard Shorthand.* If you have a 16K system, enter *CLEAR 200,15872.* If you have a 4K system, *CLEAR 200,3584.*

Next, load in *Keyboard Shorthand* and *EXEC* it. BASIC's OK prompt will immediately reappear, and everything will seem to function normally. Indeed, everything *will* function normally, until you hold down the down arrow key.

Holding down the down arrow key tells *Keyboard Shorthand* to do its thing. If you then press an alphabetic key, the corresponding abbreviation will appear on the screen instead of just the usual letter.

Holding down the down arrow key and pressing [ENTER] will cause a list of all the alphabetic keys and their abbreviations to be displayed. This is handy if you forget for a moment which key does what. The prompt "Press Enter to Continue" will appear at the bottom of the screen under the abbreviations list. Pressing [ENTER] will cause the screen to clear and OK to appear in the upper left corner. Please note that if you were in the midst of entering a program line, it will be lost.

(Roger Schrag, currently studying computer science at the University of California at Berkeley, enjoys working with the CoCo and writing articles for ***the Rainbow.*** *He also designs and translates programs for Adventure International.)*

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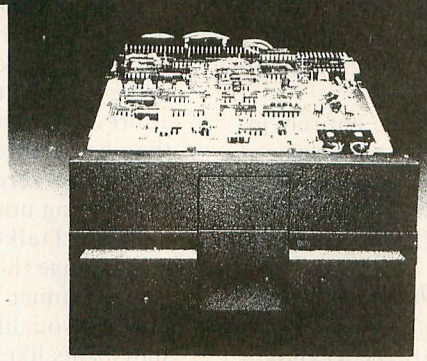

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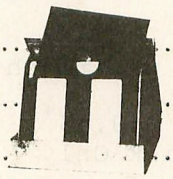

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Also note that to implement an abbreviation or to print a list of abbreviations you must hold down the down arrow key *as you press the other key*. This works in much the same manner as you hold the [SHIFT] while pressing the semicolon to produce a plus sign.

By the way, *Keyboard Shorthand* is written entirely in position independent code. This means that it may be placed anywhere in memory and it will still work properly. This allows you to use the offset load feature of *CLOADM* and *LOADM*. Just remember to alter your *CLEAR* command accordingly.

Are you curious about how *Keyboard Shorthand* works? If you are, then here is a brief explanation:

Keyboard Shorthand patches itself into the keyboard input routine so that whenever BASIC wants to wait for you to type something, it will call on *Keyboard Shorthand*'s special routine, instead of the regular routine contained in the ROM.

Keyboard Shorthand calls on the regular input routine (the one located at [$A000]) to see if a key is pressed. It then checks to see if the down arrow key is being held down. If it is not, then everything is very much business as usual.

If, however, the down arrow key is being held down, then *Keyboard Shorthand* takes a closer look at that key you just now pressed. If it is the [ENTER] key, than an abbreviation list is printed.

If it is an alphabetic key, then *Keyboard Shorthand* looks up the proper abbreviation in the table. The memory location of the first character of the abbreviation is stored in PNTR. Also, STATUS is set to a value of one. (It usually has a value of zero.)

The next time BASIC calls on *Keyboard Shorthand* for keyboard input, it will note that STATUS is not zero. Instead of scanning the keyboard as usual, a character will be read from the abbreviation table and PNTR will be bumped up by one so that it now points to the next character in the abbreviation. *Keyboard Shorthand* "spoon feeds" the abbreviation to BASIC one character at a time like this until the whole abbreviation has been completed. Then STATUS is reset to zero, and *Keyboard Shorthand* goes back to functioning normally.

Earlier I talked about customizing the abbreviations. You may change the FCC instructions in the abbreviation table in any manner you please. An abbreviation may be as complex as you like, and may even contain multiple BASIC statements like:

```
PRINT#-2,"DISK DIRECTORY":POKE 111,254:DIR 0
```

You may also have the abbreviation automatically hit the [ENTER] key for you. You do this by adding an FCB 13 instruction (look at R for an example). When you add [ENTER] to an abbreviation, it appears on the screen as usual, but *begins executing right away*. Holding down the down arrow key and pressing R, for example, causes *RUN* to appear on the screen and the program to begin running immediately.

Your abbreviations may be as specialized, long, and fancy as you wish. However, if you make them much longer than they are as shown in the listing, you will need to lower the ORG statement to make more memory available. You will need to lower your *CLEAR* instruction also.

The next time you see a huge program in *the Rainbow* that you want to key in, try doing it with *Keyboard Shorthand*. It will go much quicker, and with fewer ?SN Error nightmares. Guaranteed.

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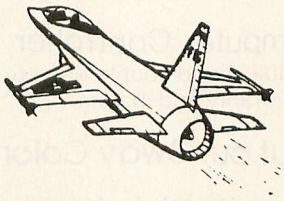

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```
                        00100 **********************
                        00110 * KEYBOARD SHORTHAND *
                        00120 **********************
                        00130 *
                        00140 *BY:
                        00150 *  ROGER SCHRAG
                        00160 *  2054 MANNING AVENUE
                        00170 *  LOS ANGELES, CA 90025
                        00180 *
                        00190 *
7E00                    00200         ORG    $7E00   COMPLETELY RELOCATABLE
                        00210 *
                        00220 *TABLE OF ABBREVIATIONS. ZERO SEPARATES ENTRIES
                        00230 *
7E00    00              00240 TABLE   FCB    0       STARTS WITH A ZERO
7E01    41              00250         FCC    *AND*
7E04    00              00260         FCB    0       A
7E05    47              00270         FCC    *GOTO *
7E0A    00              00280         FCB    0       B
7E0B    43              00290         FCC    *CONT*
7E0F    0D              00300         FCB    13      CARRIAGE RETURN
7E10    00              00310         FCB    0       C
7E11    44              00320         FCC    *DIR*
7E14    00              00330         FCB    0       D
7E15    45              00340         FCC    *EDIT *
7E1A    00              00350         FCB    0       E
7E1B    46              00360         FCC    *FOR *
7E1F    00              00370         FCB    0       F
7E20    47              00380         FCC    *GOSUB *
7E26    00              00390         FCB    0       G
7E27    4C              00400         FCC    *LOADM"HIRES"*
7E33    00              00410         FCB    0       H
7E34    49              00420         FCC    *INPUT *
7E3A    00              00430         FCB    0       I
7E3B    45              00440         FCC    *ELSE *
7E40    00              00450         FCB    0       J
7E41    4B              00460         FCC    *KILL "*
7E47    00              00470         FCB    0       K
7E48    4C              00480         FCC    *LOAD "*
7E4E    00              00490         FCB    0       L
7E4F    50              00500         FCC    *PRINT MEM*
7E58    0D              00510         FCB    13      CARRIAGE RETURN
7E59    00              00520         FCB    0       M
7E5A    4E              00530         FCC    *NEXT *
7E5F    00              00540         FCB    0       N
7E60    4F              00550         FCC    *OR*
7E62    00              00560         FCB    0       O
7E63    50              00570         FCC    *POKE *
7E68    00              00580         FCB    0       P
7E69    53              00590         FCC    *STRING$(*
7E71    00              00600         FCB    0       Q
7E72    52              00610         FCC    *RUN*
7E75    0D              00620         FCB    13      CARRIAGE RETURN
7E76    00              00630         FCB    0       R
7E77    53              00640         FCC    *SAVE "*
7E7D    00              00650         FCB    0       S
7E7E    50              00660         FCC    *PEEK(*
7E83    00              00670         FCB    0       T
7E84    20              00680         FCC    * USING*
7E8A    00              00690         FCB    0       U
7E8B    4F              00700         FCC    *OPEN "*
7E91    00              00710         FCB    0       V
7E92    43              00720         FCC    *CLOSE*
7E97    00              00730         FCB    0       W
7E98    4C              00740         FCC    *LEFT$(*
7E9E    00              00750         FCB    0       X
7E9F    4D              00760         FCC    *MID$(*
7EA4    00              00770         FCB    0       Y
7EA5    52              00780         FCC    *RIGHT$(*
7EAC    00              00790         FCB    0       Z
                        00800 *
```


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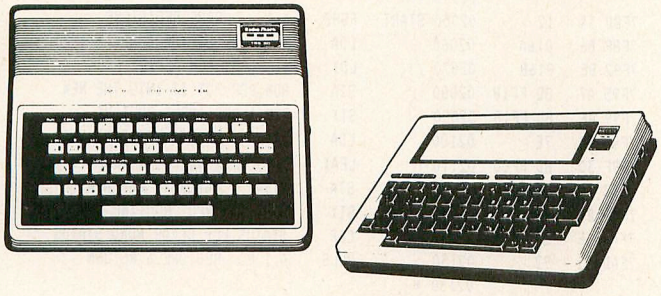

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```
                        00810 *VARIABLES
                        00820 *
7EAD    00              00830 STATUS  FCB   0 IF AN ABBREVIATION IS IN PROGRESS
7EAE    0000            00840 PNTR    FDB   0 WHICH ABBREVIATION IS BEING USED
                        00850 *
                        00860 *THE NEW INPUT FROM DEVICE ROUTINE
                        00870 *
7EB0 96 6F              00880 INPUT   LDA   $6F     INPUTTING FROM KEYBRD?
7EB2 27 03              00890         BEQ   KEYBRD  USE NEW ROUTINE IF SO
7EB4 12                 00900 ROM     NOP         GO BACK INTO ROM ROUTINE
7EB5 12                 00910         NOP         (AT START CODE IS PUT
7EB6 12                 00920         NOP         HERE IN PLACE OF NOPS)
                        00930 *
                        00940 *WHEN BASIC WANTS KEYBOARD INPUT, CONTROL GOES TO
                        00950 *THE KEYBRD ROUTINE
                        00960 *
7EB7 34 15              00970 KEYBRD  PSHS  X,B,CC  SAVE REGISTERS
7EB9 0F 70              00980         CLR   $70     CLEAR ROM'S FLAG
7EBB BD A199            00990 WAIT    JSR   $A199   FLASH CURSOR
7EBE 8D 0D              01000         BSR   GETKEY  STROBE KEYBOARD
7EC0 27 F9              01010         BEQ   WAIT    WAIT UNTIL KEY PRESSED
7EC2 C6 60              01020         LDB   #$60    ERASE THE CURSOR
7EC4 E7 9F 0088         01030         STB   [$88]   FROM THE SCREEN
7EC8 35 15              01040         PULS  CC,B,X  RESTORE REGISTERS
7ECA 32 62              01050         LEAS  2,S     CLEAN UP STACK
7ECC 39                 01060         RTS           RETURN
                        01070 *
                        01080 *GETKEY ROUTINE STROBES THE KEYBOARD AND RETURNS
                        01090 *ASCII CODE OF KEY PRESSED. IT DIFFERS FROM THE
                        01100 *ROM ROUTINE AT [$A000] IN THAT IT HANDLES THE 26
                        01110 *ABBREVIATIONS.
                        01120 *
7ECD 34 10              01130 GETKEY  PSHS  X        SAVE X REGISTER
7ECF 6D 8C DB           01140         TST   STATUS,PCR SKIP AHEAD IF AN ABBREV-
7ED2 26 30              01150         BNE   DOWORD  IATION IS IN PROGRESS
7ED4 AD 9F A000         01160         JSR   [$A000] SCAN KEYBOARD
7ED8 34 03              01170         PSHS  A,CC    SAVE REGISTERS
7EDA B6 0156            01180         LDA   $156    IS THE DOWN ARROW KEY
7EDD 84 08              01190         ANDA  #$8     BEING HELD DOWN?
7EDF 26 35              01200         BNE   EXIT    EXIT IF NOT
7EE1 35 03              01210         PULS  A,CC    A CONTAINS KEY PRESSED
7EE3 34 03              01220         PSHS  A,CC    PUT REGISTERS BACK
7EE5 81 0D              01230         CMPA  #$0D    ENTER KEY PRESSED?
7EE7 27 31              01240         BEQ   LIST    IF SO, PRINT UP LIST
7EE9 80 41              01250         SUBA  #$41    A LETTER KEY PRESSED?
7EEB 25 29              01260         BLO   EXIT    EXIT IF NOT
7EED 81 1B              01270         CMPA  #$1B    ...
7EEF 24 25              01280         BHS   EXIT    ...
7EF1 32 62              01290         LEAS  2,S     CLEAN UP STACK
7EF3 30 8D FF09         01300         LEAX  TABLE,PCR TABLE OF ABBREVIATIONS
7EF7 6D 80              01310 FINDIT  TST   ,X+      ZERO MARKS END OF EACH
7EF9 26 FC              01320         BNE   FINDIT  SKIP THRU WHOLE ABBREV
7EFB 4A                 01330         DECA          SKIP AS MANY ABBREVS
7EFC 2A F9              01340         BPL   FINDIT  AS NECESSARY
7EFE AF 8C AD           01350         STX   PNTR,PCR SAVE THE LOCATION
7F01 6C 8C A9           01360         INC   STATUS,PCR SET WORD STATUS
                        01370 *
                        01380 *PROCESS AN ABBREVIATION, WHETHER JUST STARTED OR
                        01390 *ALREADY IN PROGRESS, ONE CHARACTER AT A TIME
                        01400 *
7F04 AE 8C A7           01410 DOWORD  LDX   PNTR,PCR GET LOCATION OF ABBREV
7F07 A6 80              01420         LDA   ,X+     GET NEXT CHARACTER
7F09 AF 8C A2           01430         STX   PNTR,PCR SAVE NEW LOCATION
7F0C 6D 84              01440         TST   ,X      END OF ABBREVIATION?
7F0E 26 03              01450         BNE   NOTEND  SKIP AHEAD IF NOT
7F10 6F 8C 9A           01460         CLR   STATUS,PCR RESET WORD STATUS
7F13 4D                 01470 NOTEND  TSTA          SETM THE FLAGS
7F14 35 90              01480         PULS  X,PC    RESTORE & RETURN
7F16 35 03              01490 EXIT    PULS  A,CC    GET THE KEY PRESSED
7F18 35 90              01500         PULS  X,PC    RESTORE & RETURN
                        01510 *
                        01520 *LIST ALL KEYS AND THEIR ABBREVIATIONS
                        01530 *
7F1A BD A928            01540 LIST    JSR   $A928   CLEAR SCREEN
7F1D 8E 0420            01550         LDX   #$420   PUT CURSOR NEAR
7F20 9F 88              01560         STX   $88     TOP OF SCREEN
7F22 30 8D FEDB         01570         LEAX  TABLE+1,PCR ABBREVIATIONS LIST
7F26 86 41              01580         LDA   #$41    START WITH "A" KEY
7F28 34 02              01590 L1      PSHS  A       SAVE THE KEY DONE NOW
7F2A 8D 3C              01600         BSR   VIDEO   PRINT IT ON SCREEN
7F2C 86 3A              01610         LDA   #$3A    A COLON
7F2E 8D 38              01620         BSR   VIDEO   PRINT IT ON SCREEN
7F30 86 20              01630         LDA   #$20    A SPACE
7F32 8D 34              01640         BSR   VIDEO   PRINT IT ON SCREEN
7F34 A6 80              01650 L2      LDA   ,X+     GET A CHARACTER
7F36 27 0A              01660         BEQ   L4      SKIP IF END OF ABBREV
7F38 81 20              01670         CMPA  #$20    IS IT A PRINTABLE CHR?
7F3A 24 02              01680         BHS   L3      SKIP AHEAD IF SO
7F3C 8A 80              01690         ORA   #$80    MAKE IT A GRAPHICS CHR
7F3E 8D 28              01700 L3      BSR   VIDEO   PRINT THE CHARACTER
7F40 20 F2              01710         BRA   L2      LOOP BACK FOR REST
7F42 DC 88              01720 L4      LDD   $88     GET CURSOR POSITION
7F44 C4 F0              01730         ANDB  #$F0    REPOSITION IT TO THE
7F46 C3 0010            01740         ADDD  #$10    NEXT COLUMN/LINE
7F49 DD 88              01750         STD   $88     SAVE NEW POSITION
7F4B 35 02              01760         PULS  A       RESTORE KEY COUNT
7F4D 4C                 01770         INCA          GO TO NEXT KEY
7F4E 81 5A              01780         CMPA  #$5A    ARE WE ALL DONE?
7F50 23 D6              01790         BLS   L1      LOOP BACK IF NOT
7F52 30 8D 001C         01800         LEAX  PROMPT,PCR "PRESS ANY KEY"
7F56 A6 80              01810 L5      LDA   ,X+     GET A CHARACTER
7F58 27 04              01820         BEQ   L6      SKIP AHEAD IF END
7F5A 8D 0C              01830         BSR   VIDEO   PRINT CHARACTER
7F5C 20 F8              01840         BRA   L5      LOOP BACK FOR REST
7F5E AD 9F A000         01850 L6      JSR   [$A000] SCAN KEYBOARD
7F62 27 FA              01860         BEQ   L6      WAIT FOR A KEY
7F64 6E 9F FFFE         01870         JMP   [$FFFE] RETURN TO BASIC
                        01880 *
                        01890 *ROUTINE TO PRINT ON SCREEN
                        01900 *
7F68 34 16              01910 VIDEO   PSHS  A,B,X   SAVE REGISTERS
7F6A 0F 6F              01920         CLR   $6F     SELECT DEVICE ZERO
7F6C AD 9F A002         01930         JSR   [$A002] PRINT ON SCREEN
7F70 35 96              01940         PULS  X,B,A,PC RESTORE & RETURN
                        01950 *
                        01960 *MESSAGE PRINTED AT BOTTOM OF LIST
                        01970 *
7F72    0D              01980 PROMPT  FCB   13      CARRIAGE RETURN
7F73    50              01990         FCC   *PRESS ANY KEY TO CONTINUE*
7F8C    00              02000         FCB   0       END OF MESSAGE
                        02010 *
                        02020 *CODE BELOW PATCHES THE NEW KEYBOARD DRIVER
                        02030 *INTO OPERATION
                        02040 *
7F8D 34 12              02050 START   PSHS  X,A     SAVE REGISTERS
7F8F B6 016A            02060         LDA   $16A    GET THE CURRENT INPUT
7F92 BE 016B            02070         LDX   $16B    FROM DEVICE HOOK
7F95 A7 8D FF1B         02080         STA   ROM,PCR PUT IT INTO THE NEW
7F99 AF 8D FF18         02090         STX   ROM+1,PCR INPUT ROUTINE
7F9D 86 7E              02100         LDA   #$7E    OPCODE FOR "JMP NN"
7F9F 30 8D FF0D         02110         LEAX  INPUT,PCR WHERE TO JUMP TO
7FA3 B7 016A            02120         STA   $16A    PATCH IN OUR NEW
7FA6 BF 016B            02130         STX   $16B    INPUT ROUTINE
7FA9 6F 8D FF00         02140         CLR   STATUS,PCR CLEAR WORD STATUS
7FAD 35 92              02150         PULS  A,X,PC  RESTORE & RETURN
                        02160 *
        7F8D            02170         END   START
00000 TOTAL ERRORS
```


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RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings you will find in *the Rainbow* are formatted for a 32-character screen — so they will show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on listings indicates that program is available through our *Rainbow On Tape* service. An order form for this service is on the insert card bound in the magazine.

RAINBOW
CERTIFICATION
SEAL

The Rainbow Seal

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product which carries the Seal has been physically seen by us and that it does, indeed, exist.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to *the Rainbow* for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal. This lets you know that we have seen the product and that it does, indeed, exist.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in *the Rainbow* and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Using Machine Language

Machine Language programs are one of the features of *the Rainbow*. There are a number of ways to "get" these programs into memory so that you can operate them.

The easiest way is by using an Editor-Assembler, a program you can purchase from a number of sources.

An editor-assembler allows you to enter mnemonics into your CoCo and then have the editor-assembler assemble them into specific instructions that are understood by the 6809 chip that controls your computer.

When you use an editor-assembler, all you have to do, essentially, is copy the relevant instructions from *the Rainbow's* listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand assemble some programs.

Use the following program if you wish to hand assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00.

What's A CoCo

CoCo is an affectionate name which was first given to the TRS-80 Color Computer by its many fans, users and owners. As such, it is almost a generic term for three computers, all of which are very much alike.

When we use the term CoCo, we refer to the TRS-80 Color Computer, the TDP System-100 Computer and the Dragon-32 Computer. It is easier than using the three "given" names throughout *the Rainbow*.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and TRS-80 Color are, for all purposes, the same computer in a different case, these terms are almost always interchangable.

The Rainbow Check

The small boxes which you see with programs in *the Rainbow* are our *RAINBOW CHECK* program, which is designed to help you type in programs accurately.

The check program will count the number of characters you type in. You can then compare the number the *RAINBOW CHECK* gives you to those printed in *the Rainbow*. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use the *RAINBOW CHECK*, type in the program, *CSAVE* it for future use, then type in the command *RUN* and press *ENTER*. Once the program has run, type *NEW* to remove it from that area into which you will be keying programs.

Now, whenever you press the down arrow, CoCo will give you the hexadecimal number of bytes in memory. This is to check against the numbers printed in *the Rainbow*. If your number is different, check the listing carefully to be sure you typed in the proper BASIC program code.

As the hexadecimal number appears in the upper-left corner of the monitor screen, you may want to clear the screen and press the spacebar five or six times to move the cursor out of the way for easy reading. The *RAINBOW CHECK* counts spaces, too, follow the spacing just as it appears in the magazine.

Here's the program:

```
 10 CLS:IF PEEK(116)=127 THEN
X=32688 ELSE X=16304
 20 CLEAR 25,X-1
 30 IF PEEK(116)=127 THEN X=32688
ELSE X=16304
 40 FOR Z=X TO X+77
 50 READ Y:W=W+Y:PRINT Z,Y;W
 60 POKE Z,Y:NEXT
 70 IF W=5718 THEN 80 ELSE PRINT
"DATA ERROR":STOP
 80 EXEC X:END
 90 DATA 182, 1, 106, 167, 141, 0, 68
 100 DATA 134, 126, 183, 1, 106, 190
 110 DATA 1, 107, 175, 141, 0, 57, 48
 120 DATA 141, 0, 4, 191, 1, 107, 57
 130 DATA 129, 10, 38, 44, 52, 22, 220
 140 DATA 27, 147, 25, 142, 4, 0, 141
 150 DATA 6, 31, 152, 141, 2, 32, 25
 160 DATA 52, 2, 68, 68, 68, 68
 170 DATA 141, 4, 53, 2, 132
 180 DATA 15, 129, 9, 46, 4, 139, 112
 190 DATA 32, 2, 139, 55, 167, 128, 57
 200 DATA 53,22,126,0,0
```

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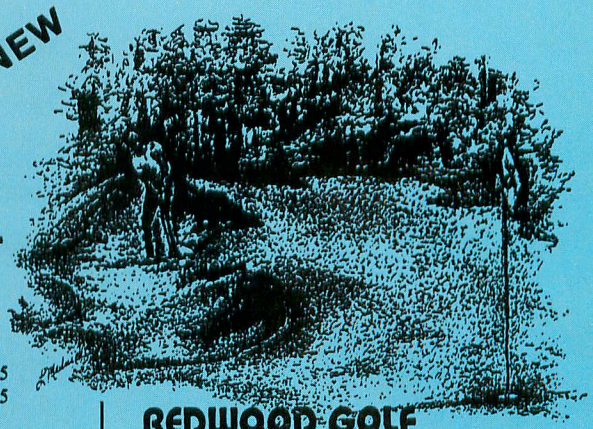

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by David C. Lengyel

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An Introduction To The Science Of Image Processing

By Robert K. Tyson, Ph.D.

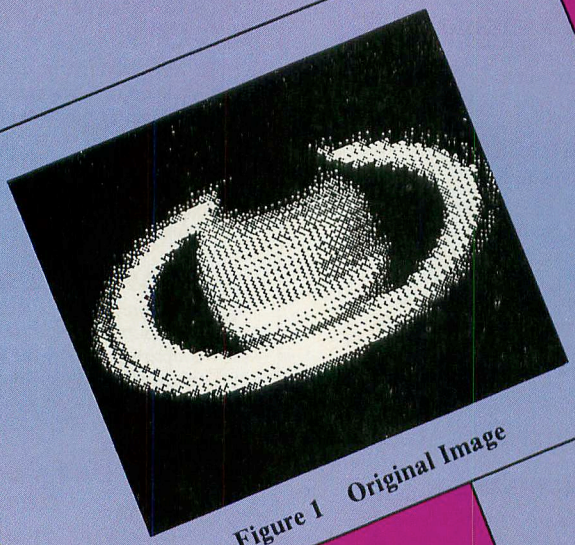

Figure 1 Original Image

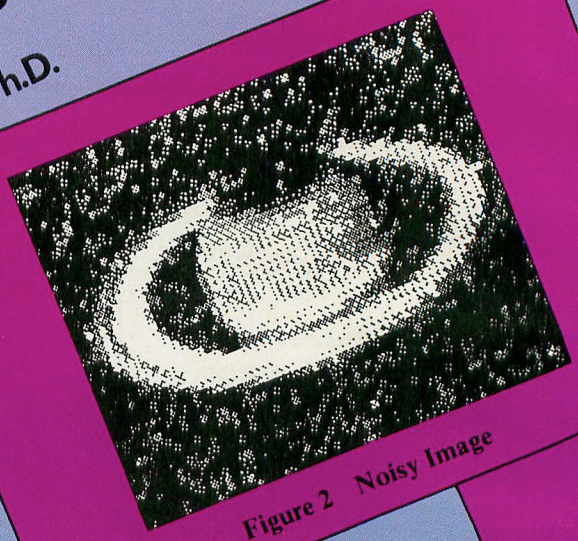

Figure 2 Noisy Image

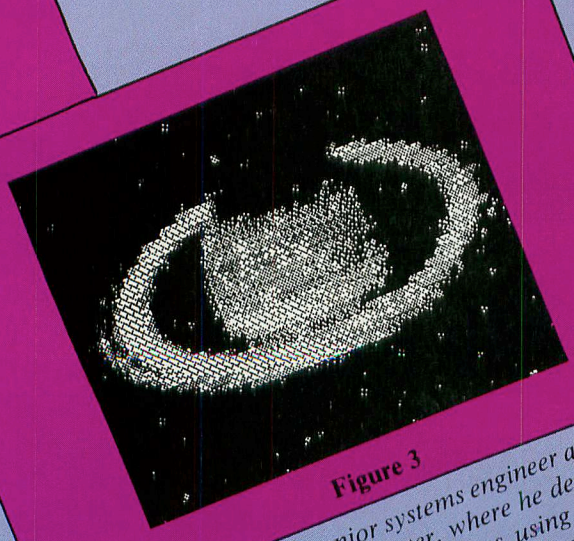

Figure 3

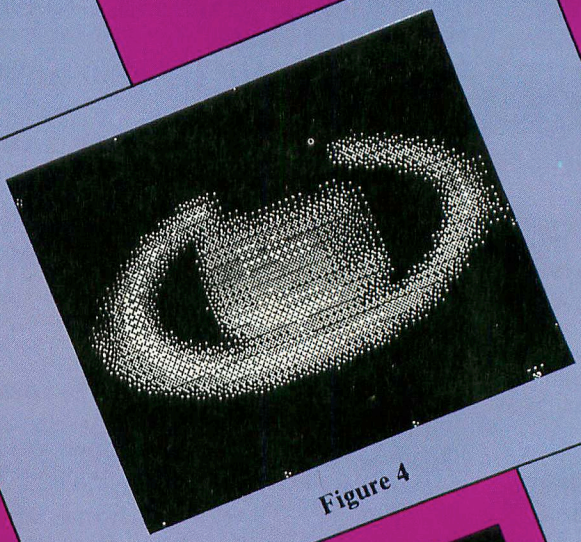

Figure 4

Figure 5 Restored Image

(Dr. Bob Tyson is a senior systems engineer at United Technologies Research Center, where he designs and analyzes high energy laser systems using computer simulations. He is the author of "Strategy Football" and "Election '84," which recently appeared in ***the Rainbow****.)*

Microcomputers are good for a lot of things that used to be done by hand, like filing, counting, simple arithmetic, typing complicated mathematics, or game playing. Only when computers began doing things that couldn't be done any other way, were we in the computer age. The first video game, Pong, was evolutionary. It had its alter ego on the tennis court because it could be "played" there. But the computer game, *Breakout* was revolutionary. It had no such alter ego in the real world. It only made sense as a video game and was a true "computer" game. Scientific programming had the same evolution. Early computers could calculate the roots of a quadratic equation very fast but there already was a simple equation for it, so computers weren't needed. Image processing *needed* a computer. Stereo viewers and overlaying transparencies were crude tools for image enhancement. The computer and its lightning-fast speed revolutionized image processing to create what it is today.

Image processing is seen all around us in magazine advertisements, police fingerprint identification, the weather report, medicine, and the entertainment industry (especially television). The most dramatic examples have been the phenomenal satellite pictures from Jupiter and Saturn. The original "images" were just streams of zeroes and ones with noise. These are smoothed, enhanced, averaged, and modified into the pictures that we see. Without digital image processing, this science, and what it produces, would not be possible.

What is image processing? It is the procedure where a two-dimensional image is changed to make it more easily perceived, by either the human eye or an electronic eye. The useful information is contained in a raw image, but it is often obscured by blurring, camera or object motion, electronic noise, or background light. Image processing can be applied to remove the obscuring effects and retrieve the information.

What does the program do? Lines 500-510 contain the menu and "traffic cop." Everything branches from here. Lines 9000—9026 contain a coded "image" of the planet Saturn to use as an example. The image is coded as strings of hexadecimal values with G=16 rather than 10. The rest of the program works in an "operator" fashion. That is, a section is branched to, something happens, and it returns to line 500. What happens? Now the fun part comes in.

Listing 1 is a BASIC program that demonstrates the important techniques and allows you to enhance any image. The program also shows the versatility of the TRS-80 Color Computer for serious scientific work. It requires a 32K Extended BASIC CoCo (with disk and printer optional, but recommended). The program proceeds by allowing you, the user, to "operate" on a Raw Image and then display the Processed Image. You can use this process to "operate" again and again, and produce more processed images. You should remember that the processing is usually irreversable (called Destructive) and "inverse" operations are rare. In other words, once you smooth a raw image you cannnot get the raw image back unless you stored it somewhere. This makes a disk drive useful and almost necessary. You can store and retrieve images quickly. For those without a disk, I will describe the modifications you need for cassette tape storage.

The program is menu-oriented. After keying-in the program, type *RUN*. Remember to leave spaces as you type since the compressed format will only work after it is tokenized. The logo will be displayed while it loads a machine language program from DATA lines 9100-9106. A menu will appear with eight choices. Three of the options will not alter the image (D,V,P); five of them will change it. I will briefly describe how the program works and then tell you how you can use it.

Memory area $4A00—$4C0B contains a machine language program shown in listing 2. This accomplished all the tough tasks fast. I originally wrote the whole program in BASIC but it was just too slow. It took three minutes just to display the image with *GET* and *PUT*. Memory area 23072—26143 contain the image. It is a 64-column by 48 row matrix with 64 gray levels. It contains 64x48=3072 bytes. Memory are 20000—23071 contains a scratch pad area. Whenever a complicated operation is performed, the computer must "read" the image and store a result without altering the original image. Only when the process is complete does it transfer the scratch pad over to the image matrix for you to see. The memory area above 26144 is available for a printer driver routine for graphics hard copy. My program loads the routine from line 2264. Your routine should load it there too. Just change DEFUSR7 in line 23 to whatever address your printer driver needs. Also set the *POKE 150* in line 2264 to the Baud rate of your printer/interface. If you use a 600 Baud printer (like DMP 100, DMP 200, LP VII, etc.) don't *POKE* anything.

Lines 1000—1330 create an image from a menu. Four images can be formed. The first is a test pattern which has all the gray scales (density of dots) and the letter "H." The second is an image of the planet Saturn (only the non-zero lines are stored in data; the zeroes are entered by clearing the image with a USR1 call in line 1200). The third possibility is loading a previously stored image. The program is set up for disk storage, but a simple *CLOADM K$* in line 1320 will allow tape storage. Also change line 8020 to read *CSAVEM*, etc. if you are going to use cassette tape. The fourth "image" is choice 0 — just clear the image.

Lines 2000—2264 display the image on the screen in 64 x 48 picture elements (pixels) with from 0 to 16 dots in a pixel. This means it is actually 17 gray levels but no image processing scientist would admit to having an odd number of gray levels. The display routine is in machine language located at $4AF2. It steps through the rows and columns using the value of the pixel to offset a lookup to the table of dot-pattern values stored at $4BC7. It then moves the dots to the most-significant nibble (4 bits) or the least significant nibble of the 8-bit "word." It stores this value on graphics Page 1. If you press [H] while the display is on, the program jumps to your printer driver routine to produce a hard copy for you. Any other key-press will just return you to the menu.

Line 3000 performs an "edge enhancement." This is a Destructive operation which will highlight all the high contrast edges in your image. Low contrast areas like smooth surfaces will just be zeroed. Sharp edges are enhanced. The ML routine at $4A98 performs this operation. It steps through the rows and columns and subtracts neighboring values to the right and below it. It then takes the absolute value of this sum and stores it in the scratch pad. After all the pixels (except the border which doesn't have meaningful neighbors) are operated upon, the routine transfers the scratch pad into the new image.

Lines 4000—4040 add noise to the image. This is done in BASIC with the RND function. Adding noise is not image processing, but it is necessary to show you what a processor can do with a messy image. This routine is here just to "mess up" your image so the real image processing can be demonstrated. It is, by definition, Destructive. You are prompted for the number of pixels you want noisy. A "little" noise may be 100 pixels and a "lot" of noise is all 3072 pixels. The value

of the noise is the seed of RND for adding it to each pixel. Any number will do to simulate real image noise but I like 5 just to make it look neat.

Lines 5000—5600 display the image in pseudo-colors. This is a Non-Destructive process which just displays the image on a *PMODE 1* screen in four colors. Low valued pixels are green, next are yellow, etc. This is called pseudo-color, since it is often used to outline certain regions in an image when the image itself (like a medical X-ray) has no color information. After all, Saturn is really not green, blue, red, and yellow in the way that you will see it here. This routine is slow since it is written in BASIC. I didn't write it in asssembler since I use it very little. The four gray levels (four colors) are good for CoCo demonstrations, but not for serious work.

Lines 6000—6010 perform a nine-point smoothing operation. This is a Destructive routine in ML at $4A30. This routine steps through the rows and columns and takes the average value of the pixel and it's eight surrounding neighbors. It puts it in the scratch pad and then, when it completes all the pixels, it transfers the scratch pad to the image.

Lines 7000—7570 allow a histogram modification. The histogram is essentially a table of conversion values for the display. Normally when the value of a pixel is 5 it will display five dots in that pixel area, or 11 dots for a value of 11, etc. however, by modifying the histogram, we can make the *image scale* change. As an example, if you have a constant low light level background in an image with a value of three, the image tends to "wash out" . . . like watching a movie with the house lights on. If we subtract three from each pixel, the final image would have the "washout" removed. The routine in BASIC and ML at $4B97 allows you to threshold, add or subtract a constant value, or make a custom histogram. The custom histogram is most useful for eliminating weird camera effects or blurring. In all cases, the new histogram, ie, the conversion, will be displayed before you commit, since this is a Destructive process. You can't be too careful.

Lines 8000—8030 save the image in memory 23072—26144 to disk. Tape cassette modifications are described above.

Since you're now probably tired of reading all of this, let's go through an example to see just what this image processing is all about. Load the program and type *RUN*. The ML program will take a few seconds to load. At the menu hit [C] to create an image. At the "create" menu, hit [2] [ENTER] to produce the image of Saturn. It will take about a minute to read the data. The main menu will appear. Now hit [D] to display it. Wow! The image should look like figure 1. If you want a hard copy (ie, your printer is on, and you changed lines 23 and 2264) then hit [H] otherwise, hit any key and the main menu will reappear. You can always redisplay it any time.

Now, let's see what the program can really do. Hit [N] for noise. At the prompt for the number of pixels, type 1200 [ENTER]. At the prompt for the strength, type 5 [ENTER]. Watch the counter as it fills in random pixels. Now from the main menu, hit [D] and look at that mess! Your image should look like the noisy image in figure 2. The multiple reproductions necessary to print images in magazines have a "smoothing" effect so your image should appear noisier than that shown. This problem consistently causes magazine and newspaper publishers fits. But here's what can be done about it. Go to the main menu with your noisy image of Saturn. Hit [H] for histogram modification. Now hit [A] for add and type -5 [ENTER]. This will subtract five from each pixel. Now [D], display the image; it should look like figure 3. Not bad, but let's go further. From the main menu hit [S] to smooth the image. Now display it. Figure 4? That's a good image, but we can do better. There were too few bright areas. In other words, the contrast was low. From the main menu hit [H] to modify the histogram again. Let's just multiply each value by two to double the contrast. How? Use the custom histogram; hit [C]. Now just type in the following custom histogram:

0 -> 0, 1 -> 2, 2 -> 4, 3 -> 6, 4 -> 8, 5 -> 10, 6 -> 12,
7 -> 14, 8 -> 16, and all the rest -> 16.

When it asks "Sure?" check your input and type [Y]. Now look at your restored image of Saturn, figure 5. Not exactly like Figure 1, but that is not mathematically possible after you inserted random noise. It's still a pretty good attempt at it.

The rest is up to you. Try the test pattern and hit [E] to edge enhance it. Or smooth it. Or use the data lines to enter your own image. As demonstrated, the possibilities are endless.

This article gives you an introduction to the science of image processing. By no means is it complete. There are many other methods employed. Something called "filtering" is a very powerful tool. Smoothing and edge enhancement are special types of filtering and there are volumes written on the particular topic. If you're interested, keep at it. Try your own combinations and see what you can do. The computer age is here for all of us.

Rainbow Check Plus

1000 0313	150
1330 . . . . . 052C	164
5000 . . . . . 075C	60
7030 . . . . . 0A64	237
8000 . . . . . 0C61	227
9010 . . . . . 0F9B	240
9020 1261	157
9102 . . . . . 16EA	1
9104 . . . . . 18D4	22
END 1B06	149

The listing:

```
5 GOTO10000
7 FLAG=0:GOSUB9900:FORI=0TO26:RE
ADK$:NEXT
8 FORI=&H4A00TO&H4C0B:READK$:POK
EI,VAL("&H"+K$):NEXT
15 VD=23072:VV=&H4BAC
17 DEFUSR1=&H4A00:'CLEAR VID
18 DEFUSR2=&H4B97:'HISTOG. MOD
20 DEFUSR4=&H4A30:'SMOOTH
21 DEFUSR5=&H4A98:'EDGE
22 DEFUSR6=&H4AF2:'DISPLAY
23 DEFUSR7=&H7D92:'HARD COPY
500 CLS:PRINT@140,"M E N U":PRIN
T:PRINT" c CREATE IMAGE":PRINT"
d DISPLAY IMAGE":PRINT" n ADD NO
ISE":PRINT" s SMOOTH IMAGE":PRIN
T" h HISTOGRAM MOD":PRINT" v SAV
E TO DISK":PRINT" e EDGE ENHANCE
MENT":PRINT" p PSEUDO-COLOR ENHA
NCEMENT"
505 PRINT@480,"DURING DISPLAY, P
RESS <H> FOR   HARD COPY"
510 K$=INKEY$:IFK$=""THEN510ELSE
```

```
IFK$="C"THEN1000ELSEIFK$="D"THEN
2000ELSEIFK$="E"THEN3000ELSEIFK$
="N"THEN4000ELSEIFK$="P"THEN5000
ELSEIFK$="S"THEN6000ELSEIFK$="H"
THEN7000ELSEIFK$="V"THEN8000
1000 CLS:PRINT"CREATE IMAGE":PRI
NT@128,"0=ERASE IMAGE
        1=TEST PATTERN
        2=SATURN
        3=FROM DISK"
1010 INPUTK:ONK+1GOTO1011,1020,1
200,1300,1010
1011 X=USR1(0):GOTO500
1015 PRINT"WORKING ...":RETURN
1020 GOSUB1015:X=USR1(0):'TEST P
ATTERN
1030 FORIR=8TO40:FORIC=20TO26:PO
KEVD+IR*64+IC,8:NEXTIC:FORIC=38T
044:POKEVD+IR*64+IC,8:NEXTIC,IR
1050 FORIR=20TO28:FORIC=27TO37:P
OKEVD+IR*64+IC,8:NEXTIC,IR
1060 FORI=0TO16:POKEVD+I,I:POKEV
D+I+64,I:POKEVD+I+128,I:POKEVD+I
+192,I:NEXT
1070 GOTO500
1200 GOSUB1015:X=USR1(0):'SATURN
1205 RESTORE:FORJ=0TO26:READK$:F
ORI=1TO64:IFMID$(K$,I,1)="G"THEN
1248ELSEV=VAL("&H"+MID$(K$,I,1))
1232 GOTO1250
1248 V=16
1250 POKEVD+639+64*J+I,V
1260 NEXTI,J
1280 GOTO500
1300 CLS:PRINT"LOAD FROM DISK":P
RINT"ENTER DISK FILENAME/EXT"
1310 INPUTK$
1320 LOADMK$
1330 GOTO500
2000 PMODE4,1:SCREEN1,1:PCLS
2010 X=USR6(0)
2250 K$=INKEY$:IFK$=""THEN2250EL
SEIFK$="H"THEN2262ELSE2260
2260 SCREEN0,0:GOTO500
2262 SCREEN0,0:IFFLAG=0THEN2264E
LSE2263
2263 X=USR7(0):GOTO500
2264 FLAG=1:POKE150,1:LOADM"GSPR
P.BIN":GOTO2263
3000 CLS:PRINT"EDGE ENHANCEMENT"
:X=USR5(0):GOTO500
4000 CLS:PRINT"ADD NOISE":PRINT"
ENTER NUMBER OF PIXELS AFFECTED
          1 - 3072"
4010 INPUTK:IFK<0ORK>3072THEN400
0
4012 PRINT"ENTER STRENGTH OF NOI
SE                  0 - 16"
4014 INPUTI:IFI<0ORI>16THEN4012
4020 PRINT@294,K;:FORJ=0TOINT(K)
:PRINT@300,J:R=RND(3072):A=VD+R:
V=PEEK(A):V=V+RND(I):IFV>16THENV
=16
4035 POKEA,V:NEXTJ
4040 GOTO500
5000 PMODE1,1:SCREEN1,0:PCLS:FOR
IR=0TO47:FORIC=0TO63:V=INT((PEEK
(VD+IR*64+IC)+3)/4):IFV=0THENV=1
5010 FORIR=0TO47:FORIC=0TO63
5015 V=INT((PEEK(VD+IR*64+IC)+3)
/4):IFV=0THENV=1
5020 PSET(IC*4,IR*4,V):PSET(IC*4
+2,IR*4,V):PSET(IC*4,IR*4+2,V):P
SET(IC*4+2,IR*4+2,V):NEXTIC,IR
5500 K$=INKEY$:IFK$=""THEN5500EL
SE5600
5600 PMODE4,1:GOTO500
6000 CLS:PRINT"9 - POINT SMOOTHI
NG"
6010 X=USR4(0):GOTO500
7000 CLS:PRINT"HISTOGRAM MODIFIC
ATION                SELECT MODE:
                t=THRESHOLD
                a=ADD CONSTANT
                c=CUSTOM HISTOGRA
M"
7005 K$=INKEY$:IFK$=""THEN7005EL
SEIFK$="T"THEN7007ELSEIFK$="A"TH
EN7100ELSEIFK$="C"THEN7300ELSE70
05
```


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```
7007 PRINT"ENTER THRESHOLD MINIM
UM 0 TO 15":INPUTTM:TM=INT(TM):I
FTM<0ORTM>15THEN7007
7010 PRINT"ENTER THRESHOLD MAXIM
UM          ";TM+1;" TO 16":INPUTT
X:TX=INT(TX):IFTX<TMORTX>16THEN7
010
7020 IC=1:GOTO7400
7100 PRINT"ADD CONSTANT TO ALL V
ALUES"
7110 PRINT"ENTER CONSTANT -15 TO
 15":INPUTK:IFK<-15ORK>15THEN711
0
7120 IC=2:GOTO7400
7300 CLS:PRINT"CUSTOM HISTOGRAM
MODIFICATION":IC=3
7400 FORI=0TO16:ONICGOSUB7450,74
60,7470
7410 NEXTI:GOSUB7500:IFJ=0THEN50
0
7420 X=USR2(0):GOTO500
7450 IFI<TMTHENPOKEVV+I,TMELSEIF
I>TXTHENPOKEVV+I,TXELSEPOKEVV+I,
I
7451 RETURN
7460 V=I+INT(K):IFV<0THENPOKEVV+
I,0ELSEIFV>16THENPOKEVV+I,16ELSE
POKEVV+I,V
7461 RETURN
7470 PRINT"CONVERT FROM ";I;" TO
 ";:INPUTJ:IFJ<0ORJ>16THEN7470EL
SEPOKEVV+I,INT(J)
7471 RETURN
7500 CLS:PRINT"HISTOGRAM MODIFIC
ATION"
7510 FORI=0TO15STEP2
7520 PRINTI;"->";PEEK(VV+I);"
";I+1;"->";PEEK(VV+I+1)
7530 NEXTI
7540 I=16:PRINTI;"->";PEEK(VV+I)
7550 PRINT:PRINT:PRINT"SURE ?  (
Y/N)"
7560 J=0:K$=INKEY$:IFK$=""THEN75
60ELSEIFK$="Y"THENJ=1ELSEIFK$<>"
Y"THENJ=0
7570 RETURN
```

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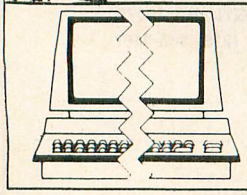

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```
8000 CLS:PRINT"SAVE TO DISK":PRI
NT"ENTER DISK FILENAME/EXT"
8010 INPUTK$
8020 SAVEMK$,23072,26144,23072
8030 GOTO500
9000 DATA 00000000000000000000
01122211000000000001221000000000
0000000000
9001 DATA 00000000000000000123
23586000000000000005621122100000
0000000000
9002 DATA 00000000000000123358D
GGGD5000000000000000008FGEC710110
0000000000
9003 DATA 00000000000002334BGGGG
GGC6300000000000001004DEEEEE900
2200000000
9004 DATA 00000000003437EGGGGGD
CAA7431000000000002231006BDDEEDC
4022000000
9005 DATA 0000000002426EGGGGD710
4AB99753321111122345640000006BCDE
EC20210000
9006 DATA 00000001443DGGGGB40000
9BBBBAA998775565666765400000005BC
DDD8012000
9007 DATA 0000001546GGGGD6000005
CCBCBCBBAAAA99989997678200000008
CDDDB00300
9008 DATA 000002746GGGGC30000009
CCCCCCCCCDDCCCCAA999998500000000
6BDAC90230
9009 DATA 00002665GGGFC30000002A
DDDDEDCCDDBBCBBAABBAA98400000000
07CDDC5040
9010 DATA 0000592DGGGE700000005B
CCCDDEEEEEEDDDCCCCBA977400000000
02ADDDCC23
9011 DATA 0002976GGGGC100000007B
CCCDEEEEEEFEEDDCCBAA976510000000
009DDDD104
9012 DATA 0005B5AGGGGA100000007B
CCBCDDEDDDDDCDCBAAA9885410000000
008DDDD204
9013 DATA 0016D4CGGGFA100000005A
CCCCCCDDDDDDCCCCB9987642000000000
009DDDC123
9014 DATA 0018D6AGGGGC100000007B
ABCCCCDDDDDCCCA99998665310000000
03BDDDA041
9015 DATA 0006CA5GGGGE600000006D
DCBCCCDCDDDDCCBAAA98678830000000
09DCDC3030
9016 DATA 0003BE6DGGGGD20000003D
GFEDDDDCCCDCCBBA99BABCB800000000
8CDCC80510
9017 DATA 00007DD6GGGGGD2000001B
FGFGGGFEEEEECCCCCCCEDC9400000009
DDCD904200
9018 DATA 000029EC8GGGGGE5000005
```

```
CEFGGGGGGGGGEFFEFFEDC950000003BD
DDD8042000
9019 DATA 0000019FE8FGGGGGC30000
5ACDEGFFGFFFGFEEEDCA75100002ADDD
DC50410000
9020 DATA 00000017EFBCGGGGGGE700
3868ABCDDDEEDDCB9864453006CDDDDC
9333000000
9021 DATA 000000003BFEBDGGGGGGGE
EEDCCBAAAA99998889ABDDDCDDEDDD95
5400000000
9022 DATA 0000000003BEEDDGGGGGG
GGGGGGGFEEEEDDEEEEEEEEEEECDB9676
1000000000
9023 DATA 00000000000017CEEDDFGG
GGGGGGGGGGGFFFEEEFEEEDEDCA998400
0000000000
9024 DATA 000000000000000026BDEED
EEEFGGGGGGGGGEFEEEEDCBAB98400000
0000000000
9025 DATA 0000000000000000000158
BCEEDDEFGGFFFFEDCCBA964100000000
0000000000
9026 DATA 0000000000000000000000
000013467777764310000000000000000
0000000000
9100 DATA8E,5A,20,4F,A7,84,30,01
,8C,66,21,25,F7,39,8E,4E,20,A6,8
4,A7,89,0C,00,30,01,8C,5A,21,25,
F3,39,8E,4E,20,A6,89,0C,00,A7,84
,30,01,8C,5A,21,25,F3,39,8D,ED,8
6,01,B7,4B,BE,B7,4B,BD,B6,4B,BE,
C6,40,3D,FD,4B,C1,4F,F6,4B,BD,F3
,4B,C1,C3,5A,20,1F,01,A6
9101 DATA84,AB,1F,AB,01,AB,88,C1
,AB,88,C0,AB,88,BF,AB,88,3F,AB,8
8,40,AB,88,41,5F,80,09,2D,03,5C,
20,F9,C1,10,23,02,C6,10,E7,89,F4
,00,B6,4B,BD,4C,B7,4B,BD,81,3F,2
5,B6,86,01,B7,4B,BD,B6,4B,BE,4C,
B7,4B,BE,81,2F,25,A6,17,FF,77,39
,17,FF,84,7F,4B,BD,7F,4B
9102 DATABE,B6,4B,BE,C6,40,3D,FD
,4B,C1,4F,F6,4B,BD,F3,4B,C1,C3,5
A,20,1F,01,A6,84,A0,01,2C,02,43,
4C,B7,4B,BF,A6,84,A0,88,40,2C,02
,43,4C,BB,4B,BF,84,0F,A7,89,F4,0
0,B6,4B,BD,4C,B7,4B,BD,81,3F,25,
C3,86,01,B7,4B,BD,B6,4B,BE,4C,B7
,4B,BE,81,2F,25,B3,17,FF
9103 DATA1D,39,DC,BA,FD,4B,C5,7F
,4B,BE,7F,4B,BD,B6,4B,BE,C6,40,3
D,FD,4B,C1,4F,F6,4B,BD,F3,4B,C1,
C3,5A,20,1F,01,B6,4B,BE,C6,80,3D
,FD,4B,C1,F6,4B,BD,4F,54,F3,4B,C
1,F3,4B,C5,1F,02,86,00,B7,4B,C0,
B7,4B,C1,8D,3F,86,11,B7,4B,C0,86
,20,B7,4B,C1,8D,33,86,22
9104 DATAB7,4B,C0,86,40,B7,4B,C1
,8D,27,86,33,B7,4B,C0,86,60,B7,4
B,C1,8D,1B,B6,4B,BD,4C,4C,B7,4B,
BD,81,3F,25,9B,7F,4B,BD,B6,4B,BE
,4C,B7,4B,BE,81,30,25,8D,39,34,2
0,A6,84,BB,4B,C0,31,8D,00,4B,E6,
A6,58,58,58,58,F7,4B,BF,A6,01,BB
,4B,C0,E6,A6,FB,4B,BF,B6
9105 DATA4B,C1,35,20,E7,A6,39,8E
,5A,20,31,8D,00,0E,A6,84,E6,A6,E
7,84,30,01,8C,66,20,25,F3,39,08,
F7,00,FF,00,F7,28,B7,00,FF,00,F7
,00,F7,00,F7,00,F7,00,FF,00,D7,0
0,FF,00,D7,00,00,00,02,04,04,02,
02,0A,0A,0B,0B,0E,0E,0E,0E,0F,0F
,00,02,00,01,01,05,05,05
9106 DATA05,05,05,05,07,07,07,07
,0F,00,00,04,04,08,02,0A,0A,0A,0
A,0E,0B,0E,0F,0F,0F,0F,00,00,00,
00,02,08,04,04,05,05,05,0D,07,07
,0F,0F,0F,00
9900 CLS3:PRINT@170,"
";:PRINT@202," I M A G E ";:PRIN
T@224,STRING$(32,143);:PRINT" P
  R O C E S S I N G ":PR
INTSTRING$(32,143);:PRINT@326,"
BY DR. BOB TYSON ";:PRINT@364,"
1983 ";:RETURN
10000 CLEAR200,18943:GOTO7
```


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58,000 Terry Steen, San Bernadino, CA
55,360 Donald Thompson, Lubbock, TX
54,200 Mike Hughey, King George, VA
54,000 Craig Edelheit, W. Bloomfield, MI

GALACTIC TREK
19,750 ★Wesley Bull, Vanscoy, Saskatchewan

GALAX ATTAX *(Spectral Associates)*
104,550 ★Mitch Hayden, Univ. of MN.
82,650 Steve Hargis, Tucson, AZ
73,000 Wes Hill, Vashon, WA
66,750 Jim Wolf, South Bend, IN
65,700 Steve Otis, Graham, WA

GERM *(Chromasette)*
374 ★Michael Foley, N. Quincy, MA

GHOST GOBBLER *(Spectral Associates)*
1,007,430 ★Todd Brannam, Charleston Hts., SC
825,250 Randy Gerber, Wilmette, IL
423,390 Rich McGervey, Morgantown, WV
255,000 John Osborne, Kincardine, Ontario
228,290 Patricia Lau, York, PA
210,500 Roger Buzard, Lima, OH
65,490 Gurtej Jassar, Campbell River, British Columbia
57,550 Rick Mansell, Calgary, Alberta

GOLF *(Aardvark)*
40 ★Matthew Brenengen, Lakelmo, MN

GRABBER *(Tom Mix)*
440,000 ★Casey Stein, Binghamton, NY
79,850 Blossom Mayor, East Greenbush, NY
60,600 Doug Rodger, Harvard, MA
49,000 Curtis Boyle, Saskatoon, Saskatchewan
42,850 Eric Lund, Millington, NJ

GRANPRIX *(Computerware)*
5,875 ★Steve Skrzyniarz, Tacoma, WA

HAIDER KHAZEN
81,000 ★David Karam, Austin, TX

HALL *(Chromasette)*
3,650 ★Michael McCafferty, Idaho Falls, ID

ICEMASTER *(Arcade Animation)*
121,775 ★Saul Munitz, Bellerose, NY

INVADERS REVENGE *(Med Systems)*
1,334,300 ★Richard Grondin, Flint, MI
502,360 John Osborne, Kincardine, Ontario
32,600 Harry Sawyer, Watchung, NJ
16,300 Eric Lund, Millington, NJ

JUNIOR'S REVENGE *(Computerware)*
1,115,300 ★Ryan Van Manen, Grand Rapids, MI
144,200 Rich Van Manen, Grand Rapids, MI
96,200 Johnny Fritsch, Whitehall, PA

KATERPILLAR ATTACK *(Tom Mix)*
3,259,620 ★Jamie Gritton, Irvine, CA
163,526 Andy Truesdale, Ferguson, MO
20,530 Jennifer Parry, Batavia, IL
14,375 Norbert Berenyi, Northvale, NJ

KEYS OF THE WIZARD *(Spectral Associates)*
640 ★Steve Skrzyniarz, Tacoma, WA
506 Greg Burke, Kenora, Ontario

THE KING *(Tom Mix)*
10,000,000 ★Roland Hendel, Mississauga, Ontario
5,112,900 Donut, Tabor, IA
4,040,300 Andy Truesdale, Ferguson, MO
2,410,200 Candy Harden, Birmingham, AL
2,213,000 James Quadarella, Brooklyn, NY
990,800 Paul Gutierrey, Moorpark, CA

KRON *(Oregon Color Computers)*
62,470 ★James Hill, Eugene, OR

KOSMIC KAMIKAZE *(IMB)*
200,550 ★Fred Iha, Columbus AFB, MS
62,250 Beth Walker, Gloucester Pt., VA
55,000 Paul Morris, Richland, WA
49,900 Mark Raphael, Englishtown, NJ
30,450 Jeff Teague, Noblesville, IN

LANCER *(Spectral Associates)*
2,354,000 ★Alex State, Las Vegas, NV
474,250 Mike Rausch, Denver, CO
469,400 Jeff Jackson, Littleton, CO
462,100 Scott Jackson, Littleton, CO
183,050 Larry Sandhaas, Springfield, IL

LUNAR ROVER PATROL *(Spectral Associates)*
154,650 ★Tom Aliff, Jr., Northeast, MD
56,550 Kevin P. Esser, Waukesha, WI
49,950 Tony Byorick, Biloxi, MS
49,550 Ronny Ong, Arlington, TX
46,800 ●Daniel Milbrath, Ann Arbor, MI

MARATHON *(the Rainbow)*
15,750 ★Craig Geist
15,110 Chris Farrell

MAXIMUM
1,102 ★Donut, Tabor, FL
1,095 Bart, Tabor, FL

MEGA-BUG *(Radio Shack)*
60,000 ★Robin Worthem, Milwaukee, WI
16,632 John Tiffany, Washington, D.C.
15,999 Ed Mitchell, Ragged Mountain, CO
14,297 Aleisha Hemphill, Los Angeles, CA
13,852 Ryan Van Manen, Grand Rapids, MI

MEGAPEDE *(Computerware)*
94,085 ★Mark Eimer, Oceanside, CA
89,036 Mark Skala, Fairview, PA
67,605 Ed Bottini, St. Louis, MO
58,070 Rich Van Manen, Grand Rapids, MI
55,291 Ryan Van Manen, Grand Rapids, MI

METEOROIDS *(Spectral Associates)*
140,210 ★Fred Iha, Columbus AFB, MS

METEORS
403,000 ★Jimmy Chan, Kincardine, Ontario
17,810 Lenny Munitz, Bellerose, NY
13,120 Jennifer Klamp, Winter Park, FL

MICROBES *(Radio Shack)*
318,830 ★Hwan Joo, Weston, Ontario
316,200 Steve Mayer & Keith Seifried, Greenville, OH
259,700 Sheila Coleman, Griffin, GA
258,150 Rick Van Manen, Grand Rapids, MI
244,700 Ian Waters, North Hero, VT

MR. MUNCH
40,000 ★Wes Hill, Vashon, WA
20,000 Scott Drake, Pine City, NY

MONKEY KONG *(Med Systems Software)*
1,000,000 ★Wes Hill, Vashon, WA
1,876 Kanti Dinda, Kingston, Ontario
1,323 Ryan Van Manen, Grand Rapids, MI
1,210 Susan Brink, Portage, MI
1,185 Mike Fath, Wadsworth, OH

MONSTER MAZE *(Radio Shack)*
520,470 ★Robert L. Bull, Trenton, Ontario
323,490 Philip Morrissey, Gilboa, NY
200,000 Daniel Milbrath, Ann Arbor, MI
150,000 Jamie Gritton, Irvine, CA
130,780 Dylan Kucera, Manitoba

MOON HOPPER *(Computerware)*
6,210,000 ★Vincent Lok, Ontario
809,750 Ed Bottini, St. Louis, MO
142,800 Ron Rhead, Willowdale, Ontario
122,500 Donut, Tabor, IA
119,790 Bart, Tabor, IA

MOROCCO GRAN PRIX *(Computerware)*
4,153 ★Frank Bottini, St. Louis, MO
2,344 Cameron Amick, Reisterstown, MD

NERBLE FORCE *(Computerware)*
315,150 ★Frank Bottini, St. Louis, MO
49,200 Jim Ganninger, Des Peres, MO

NIBBLER *(Color Quest)*
20,650 ★Rick McGervey, Morgantown, WV
14,910 Christal Glovinsky, Staten Island, NY

NINJA WARRIOR *(The Programmer's Guild)*
74,500 ★Greg Burke, Kenora, Ontario
42,400 Daniel Milbrath, Ann Arbor, MI
46,400 Jeff Willard, Chireno, TX
32,900 Rip Loomis, Long Beach, MS
28,200 Don Hammack, Long Beach, MS

OFFENDER *(American Business Computers)*
999,900 ★Scott Drake, Pine City, NY
965,400 Jim Baker, Florissant, MO
406,800 Betty Moore, Greensburg, PA
293,900 Marla Moore, Greensburg, PA
273,900 Walt Moore, Greensburg, PA

PAC-ATTACK II *(Computerware)*
107,070 ★Mark Skala, Fairview, PA
88,860 Michael J. Garozzo, Morrisville, PA
62,870 Stanley Sneed, Erwin, TN
44,000 Robert Lang, Port McNeill, BC
42,045 Dave Lubnow, Sussex, NJ

PAC-DROIDS *(The Programmer's Guild)*
1,476,730 ★Joshua Josephson, Corning, NY
577,140 Richard Cochrane, Wayne, NJ
197,490 Joe Minkstein, Jr., Half Moon Bay, CA
151,590 Annita Powell, Huber Heights, OH
140,300 John Yapp, Park Forest, IL

PACET-MAN *(American Business Computers)*
26,800 ★Vince Lok, Mississauga, Ontario
14,050 Susan Brink, Portage, MI
7,200 Fred Iha, Columbus AFB, MS
5,000 Cameron Amick, Reisterstown, MD
3,392 Norbert Berenyi, Northvale, NJ

PARACHUTE JUMP *(JARB Software)*
451,000 ★John Osborne, Kincardine, Ontario

PATTIPAK *(Petrocci Freelance)*
33,545 Bruck Kothmann, Pittsburgh, PA

PHANTOM SLAYER *(Med Systems)*
2,488 ★Troy Messer, Joplin, MO
1,852 Curtis Boyle, Saskatoon, Saskatchewan
1,306 Marc Hassler
652 Michael Brooks, Glade Spring, VA
604 J. Powell, Bournemouth, England
324 Mark Wise, Prospect, KY

PICNIC *(Computer Island)*
100,000 ★Scott Drake, Pine City, NY
1,220 Jon Bauch, South Fallsburgh, NY

PINBALL *(Radio Shack)*
6,000,000 ★Jimmy Oliver, Hants City, NS
4,000,000 Keith Seifried, Greenville, OH
2,111,900 Dale Westmoreland, Lannon, WI
1,266,250 Donut, Tabor, IA
300,250 Brad Widdup, Dundas, Ontario
48,700 Eric Lund, Millington, NJ

PLANET INVASION *(Spectral Associates)*
483,250 ★Chris Sweet, Harvard, MA
286,075 Larry Plaxton, Medley, Alberta
257,900 Ron Rhead, Willowdale, Ontario
221,350 John Cole, King City, Ontario
106,500 Jimmy Oliver, Hants City, NS
92,150 Gurtej Jassar, Campbell River, British Columbia

PLANET RAIDERS *(Aardvark)*
16,770,300 ★Michael Moruzi, Sudbury, Ont.
3,547,800 Philip Morrissey, Gilbon, NY
2,010,900 Bill Messerick, S. St. Paul, MN

POLARIS *(Radio Shack)*
256,018 ★Michael Popovich, Sr., Nashua, NH
218,450 Allen Roth, Dayton, TX
212,746 Hwan Joo, Weston, Ontario
170,100 Steve Johnson, Santa Ana, CA
151,154 Brian Austin, Rotterdam, NY
45,500 Thomas A. Heim, Harvard, MA

POLTERGEIST *(Radio Shack)*
6,455 ★Rich Van Manen, Grand Rapids, MI
4,970 Tim Warr, Bellingham, WA
4,950 Mark Dowling, San Bruno, CA
4,865 John Osborne, Kincardine, Ontario
4,860 Lori Raskob, Esalon, CA
4,730 Cliff Turnbull, Ellsworth, WI
4,690 Barb Turnbull, Ellsworth, WI

POPCORN *(Radio Shack)*
560,900 ★Vince Lok, Mississauga, Ontario
168,680 Steve Johnson, Santa Ana, CA
136,530 Scott Sehlhorst, Columbia, SC
110,570 Cameron Amick, Reistertown, MD
96,470 Mike Wells, Pittsburgh, PA

PROJECT NEBULA *(Radio Shack)*
960 ★Ian Clark, Albion, MI
650 ●Joyce Isbell, Toccoa, GA
430 Dale Westmoreland, Lannon, WI

continued

MORE... RAINBOW SCOREBOARD

PROTECTORS *(Tom Mix)*
594,610 ★Roland Hendel, Mississauga, Ontario
358,514 Cameron Amick, Reisterstown, MD
275,810 Julian Bond, Berkeley, CA
272,000 Douglas Hug, Roseville, CA
217,000 Ian Waters, North Hero, VT

PYRAMID *(Radio Shack)*
200 ★Greg Burke, Kenora, Ontario
180 Dan Burner, Fowler, FL
180 W. Knight, Mt. Hermon, CA
180 Lee Perkins, Norfolk, VA
165 Dale Westmoreland, Lannon, WI

QUASAR COMMANDER *(Radio Shack)*
1,290 ★Cliff Turnbull, Ellsworth, WI

QUEST *(Aardvark)*
2,200,000 ★B.J. Bardy, Mt. Lebanon, PA
1,000,000 Nigel Wakelin, Mt. Lebanon, PA

RAIL RUNNER *(Computerware)*
53,520 ★Jim Baker, Florissant, MO
53,400 Ed Bottini, St. Louis, MO
20,910 Nigel Wakelin, Mt. Lebanon, PA
19,400 Chris Sweet, Harvard, MA
17,325 Lenny Munitz, Bellerose, NY

ROBOT BATTLE *(Spectral Associates)*
21,000 ★Bobby Bruce, Springfield, MO

ROBOTTACK *(Intracolor)*
2,216,950 ★Randy Hankins, Tabor, IA
2,133,050 Donut, Tabor, IA
1,512,200 Robert Kiser, Monticello, MS
1,424,300 John Osborne, Kincardine, Ont.
1,219,810 Steve Skrzyniarz, Tacoma, WA

SANDS OF EGYPT *(Radio Shack)*
121 ★Grant Gillot, Calgary, Alberta
88 Mike Rausch, Denver, CO

SCARFMAN *(Cornsoft)*
495,440 ★Woody Farmer, Alberta, Canada
371,540 Stanley Sneed, Erwin, TN
342,510 Jean Rett, San Mateo, CA
121,600 M. A. Brickles, Allen Park, MI

SEA DRAGON *(Adventure International)*
75,750 ★Steve Schweitzer, Sewell, NJ
60,430 Steve Skrzyniarz, Tacoma, WA
27,500 Wes Hill, Vashon, WA
23,750 Stephen Harden, Birmingham, AL

SHAFT *(Prickly-Pear Software)*
18,150 ★Loren Seng, Tuscon, AZ
17,160 Julian Bond, Berkely, CA

SHARK TREASURE *(Computerware)*
172,000 ★Aaron Peele, Benington, VT
150,000 Lori Raskob, Esalon, CA
126,000 Curtis Boyle, Saskatoon, Saskatchewan
72,000 Marc Hassler

SHOOTING GALLERY *(Radio Shack)*
64,900 ★Robert J. Wallace, Waldorf, MD
52,010 ●Vernell Paterson, Radcliff, KY
44,870 Mark Nichols, Birsay, Saskatchewan
37,200 Chris Kulawy, St. Johnsville, NY
37,080 Gary Long, Peru, NY

SKIING *(Radio Shack)*
31.52 ★Andy Truesdale, Ferguson, MO
35.89 Peter Johnson, Chino, CA
40.10 Fred Herrmann, Flemington, NJ
49.43 John Scanlan, Prairie Village, KS
1:12.02 Tim Brown, Clio, MI

SKY DEFENSE *(Quasar Animations)*
9,700 ★Vince Lok, Mississauga, Ontario
6,700 Mike Anheluk, Fall Creek, OR
6,120 Steve Skrzyniarz, Tacoma, WA
5,200 Cameron Amick, Reisterstown, MD

SNAIL'S REVENGE *(the Rainbow)*
11,380 ★Varunee Turner, Kamloops, B.C.
4,820 Michael Rosenberg, Prestonburg, KY
4,800 Bill Partridge, Clinton, CT
1,610 David Figel, Sardis, OH
910 Samuel Smith, Columbia, SC
510 Mike Millard, Hill AFB, UT

SOLO POKER *(Radio Shack)*
830 ★Aldona Rastenis, Euclid, OH
830 ★Fran Tucher, Albilene, TX
670 Granville Bonyata, Tallahassee, FL
640 Mary J. Herring, Bloomington, IL
640 Stephen Jenkick, Pittsburgh, PA

SOLO POOL *(Tom Mix)*
110 ★Bill Steelman, Edmonds, WA
103 John Fraysse, Dahlren, VA
83 Sarah Wakelin, Mt. Lebanon, PA
83 M.A. Brickles, Allen Park, MI

SPACE ACE *(Spectral Associates)*
983 ★Matt McMann, New Boston, MI

SPACE AMBUSH *(Computerware)*
403,350 ★Jimmy Chan, Kincardine, Ontario
124,460 John Osborne, Kincardine, Ontario

SPACE ASSAULT *(Radio Shack)*
1,632,450 ★Walter Brokx, Granisle, BC
358,660 Mike Snelgrove, Oshawa, Ontario
238,580 John Cole, King City, Ontario
224,130 Derrick Kardos, Colonia, NJ
221,130 Steve Johnson,Santa Ana, CA

SPACE INVADERS *(Spectral Associates)*
1,496,030 ★Jimmy Chan, Kincardine, Ontario
62,300 Peter Niessen, Carlisle, MA
54,980 Susan Brink, Portage, MI
53,930 Linda Delisle, N. Adams, MA
29,560 Greg Brink, Portage, MI

SPACE RACE *(Spectral Associates)*
83,750 ★John Osborne, Kincardine, Ontario
62,875 Shane Deike, Bolme, TX
59,825 Jim Baker, Florissant, MO
58,100 John Cole, King City, Ontario
55,625 Steve Skrzyniarz, Tacoma, WA

SPACE RAIDERS *(Mark Data)*
112,100 ★Jimmy Chan, Kincardine, Ontario

SPACE SENTRY *(Spectral Associates)*
41,129 ★Steve Skrzyniarz, Tacoma, WA
2,625 Cameron Amick, Reisterstown, MD

SPACE SHUTTLE *(Tom Mix)*
595 ★Steve Schweitzer, Sewell, NJ
575 Fred Weissman, Brookline, MA
571 Ted McDonald, Summerville, SC
566 Tim Smith, San Rafael, CA
562 Kenton Fifield, Ft. Frances, Ontario

SPACE WAR *(Spectral Associates)*
400,190 ★Mark Felps, Bedford, TX
116,000 Peter Niessen, Carlisle, MA
52,380 Jim Baker, Florissant, MO
16,500 Chris Leek, Martintown, Ontario
11,540 David Iverson, Dorval, Quebec

STARBASE ATTACK *(IMB)*
328,000 ★Paul Morris, Richland, VA
62,551 Chris Coyle, Selden, NY
60,602 Beth Walker, Gloucester Pt., VA
35,659 Dennis Teague, Noblesville, IN
24,668 J.W. Pank, Noblesville, IN

STARBLASTER *(Micro Works)*
408,245 ★Mark Dowling, San Bruno, CA
325,790 Mike Anheluk, Fall Creek, OR
126,135 Mike Hall, Hartland, WI
113,450 Darren Noranyan, Oswego, NY
80,001 Alan Lewis, Ridgefield, CT

STARFIRE *(Intellectronics)*
10,000,000 ★Roland Hendel, Mississauga, Ontario
3,444,500 John DeMuth, Prairie de Chien, WI
2,102,450 Dean Bouchard, Kingston, N.S.
1,420,000 Steve Schweitzer, Sewell, NJ
1,000,050 Chuck Ladig, Suisun City, CA

STARSHIP CHAMELEON *(Computerware)*
861,200 ★Greg Lesher, North Chili, NY
82,200 Chris Sweet, Harvard, MA
79,250 Vince Lok, Mississauga, Ontario
75,500 Ron Pinson, Guelph, Ontario
72,600 Jim Baker, Florissant, MO

STARTREK *(Adventure International)*
90 ★Scott Santarone, Tallahassee, FL

STORM *(Computerware)*
840,010 ★Roland Hendel, Mississauga, Ontario
723,335 Chris Sweet, Harvard, MA
472,320 John Jaworski, Nashua, NY
380,000 Cameron Amick, Reisterstown, MD
312,000 Dave Lubnow, Sussex, NJ
63,415 Rip Loomis, Long Beach, MS

STORM ARROWS *(Spectral Associates)*
94,000 ★Steven Ohsie, Houston, TX
22,200 Cameron Amick, Reisterstown, MD

TEEEOFFF *(Prickly-Pear Software)*
32 ★Mark Wright, Tipton, MI

TRAPFALL *(Tom Mix)*
113,408 ★Rich Trawick, N. Adams, MI
104,456 Robert Cattral, Ottawa, Ontario
104,368 John Osborne, Kincardine, Ontario
98,588 Dan Burch, Louisville, KY
96,800 Bruce March, Barrie, Ontario

TUBE FRENZY *(Aardvark)*
98,640 ★David Hogue, Mercer, PA

VENTURER *(Aardvark)*
4,126,200 ★Greg Scott, Orlando, FL
2,291,100 Mike Sitzer, Roslyn, NY
2,657,350 Brian Panepinto, Spencerport, NY
1,769,400 Todd Hauschildt, Red Wing, MN

WACKYFOOD *(Arcade Animation)*
130,100 ★Lenny Munitz, Bellerose, NY
110,300 Bette Munitz, Bellerose, NY
99,900 Sheri Munitz, Bellerose, NY
42,800 Saul Munitz, Bellerose, NY

WHIRLYBIRD RUN *(Spectral Associates)*
516,450 ★Dan Shargel, Arroyo Grande, CA
103,900 Dann Fabian, Crestview, FL
98,400 Dave Lubnow, Sussex, NJ
48,000 Todd Brannam, Charleston Hts., SC
38,600 Darren Noranyan, Oswego, NY
30,250 Chris Cope, Central, SC

WILDCATTING *(Radio Shack)*
56,934 ★Michael Rosenberg, Prestonburg, KY
48,682 ●David Rodgers, Carbondale, IL
30,555 Gary Jones, Dale, TX
29,854 Matt Buist, Bangor, PA

ZAKSUND *(Elite Software)*
1,128,050 ★Richard Minton, West Frankfort, IL
1,008,100 Andy Mickelson, Granville, OH
950,500 Michael Rothman, Solon, OH
910,000 Steve Schweitzer, Sewell, NJ
876,200 John Osborne, Kincardine, Ontario

ZAPEM *(Chromasette)*
12,950 ★Michael McCafferty, Idaho Falls, ID

ZAXXON *(Datasoft)*
2,000,000 ★Roland Hendel, Mississauga, Ontario
1,510,000 James Quadarella, Brooklyn, NY
401,900 Mike Hughey, King George, VA
370,400 Chris Coyle, Selden, NY
235,200 Rich McGervey, Morgantown, WV
116,200 Jerry Ihle, Jacksonville, FL
77,800 Joseph Gaut, III, Altoona, PA
76,300 Buddy Ferguson, Trenton, IL

ZERO G *(Chromasette)*
19,735 ★Michael Foley, N. Quincy, MA

Adventuring With Style

By Bob Liddil

Be cautious, and remember . . . the word is everything.

Here's Joe Adventure, preparing for another all night session at the keyboard. We go down the checklist, point by point, making sure that nothing is left out.

Coffee, ten gallons. Check. Sunglasses to protect eyes from screen glare. Check. Phone off hook. Check. Wife and kids on bus to Toledo. Check. Shades pulled, dictionary and thesaurus nearby. Check. One copy of *Attack Of The Killer Dragon That Ate New Jersey*, CoCo version. Check.

Right! Now we begin.

As Joe plunges forward in this, his 17th attempt to solve this computerized version of kill the customer by driving him insane, we shall examine the wonderous compu-phenomona known as Adventure. Note the capital A which is accorded the genre by true affectionados.)

As long as there has been man there has been Adventure. Oog, prehistoric cave guy, first discovered this unique experience when he whacked a Tyrannosaur with a tree limb and then tried to run into a cave. Unfortunately, GO CAVE was executed before MOVE BOULDER and poor Oog became the first dinosaur TV dinner.

All through history, man has been locked in blind pursuit of elusive Adventure. The books are filled with examples of brave heroes who entered the wrong commands. There was Captain Vladimir Vaselescov, for example, whose burning desire to become the first Russian to reach the North Pole by sailing south caused him to EXAMINE PENGUIN without WEARing GLOVES. Vaselescov became the first explorer ever to die in a penguin stampede. If he'd seen the ribbon she was wearing, he would have realized she was the only female penguin in the entire Antartic, thus avoiding an unnecessary stomping.

---

*(Bob Liddil, **Captain Eighty,** is a well-known writer on Color Computer topics who has numerous columns and several books to his credit.)*

Computer art imitates life. While the picturized Adventures dilute the impact of different interpretations of the same phrase, the true text Adventure leaves everything to the imagination. In Adventure, the word is everything.

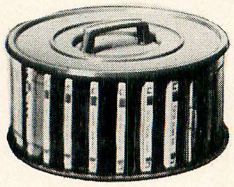
A simple statement: YOU SEE — HAND GRENADE, PEN, BOX becomes a nightmare of possibilities. The verb-noun combinations which make up the command structure and allow interaction with the program can be manipulated by the author with ease.

EXAMINE. Okay, do that to the grenade. Computer says, YOU CAN'T DO THAT . . . YET. Curses! You are committed. GET HAND GRENADE. Computer says OK. EXAMINE it now? Computer says it is ticking. *Well, there's a pen*, but it's spelled wrong so it may not fit. Typing HELP may or may not render assistance. If you DROP it you may get blown up. Better THROW GRENADE. Computer says GRENADE EXPLODES. We anticipated that. LANDS IN PEN AND EXPLODES says the computer. IN the PEN? PEN turns out to be PIG PEN and now there is enough bacon to last your whole journey. All you need is eggs and juice and you'll satisfy government requirements for a balanced Adventure.

As every Adventurer discovers, the author is in the full control of the scenario at all times. In order to solve the puzzle the user must be prepared to *think like the author*. Indeed, he must BECOME the author as he works his way into the depths of the game.

Different authors approach Adventure in different ways. There is the hardnose, or high tech, style. In *Sands of Egypt*, we have an author engaged in the grim business of totally stumping the player. This game plays like shooting BB rifles on the midway at a county fair; very few hits and a nearly unattainable goal. This style is a play for the ride. Winning is a brass ring. The high tech style is most suitable for the very smart, the very patient, and the emotionally stable Adventurer, or for somone with a fully insured computer.

ENDICOTT
COMPUTER SOFTWARE AND ACCESSORIES

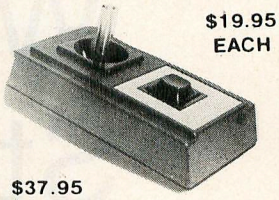


TAPE CAROUSEL

Holds up to 25 cassettes in individual compartments. Units are stackable and revolve for easy access. Clear plastic sliding covers keep tapes dust-free (tapes not included). Great for your stereo too!

~~$15.00~~ EACH $13.00 EACH

JOYSTICK



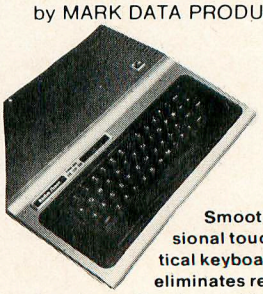
$19.95 EACH

$37.95 FOR TWO

"In use, we found the ENDICOTT JOYSTICK to be smooth and responsive. ...built to last, the Endicott model is a solid buy".
the RAINBOW, October 1982

"...provided the best feel of all the joysticks tested. ...(a) rugged unit at an affordable price."
-80 micro, March 1983

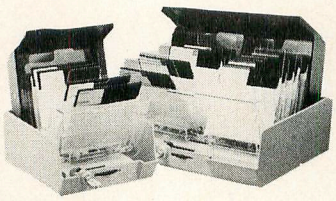
SUPER-PRO KEYBOARD
by MARK DATA PRODUCTS



Smooth professional touch. Identical keyboard layout eliminates relearning key locations. Simple installation! No soldering or wiring. Professional appearing installation. Computers made after or about Oct. 1982 require adapter.

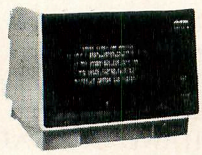
KEYBOARD: $69.95
SPECIAL! $64.95
ADAPTER: $4.95

FLIP'N'FILE
by Innovative Concepts



Holds 10 Diskettes	~~$ 5.95~~	$ 5.45
Holds 25 Diskettes With Lock	~~$20.95~~	$24.95
Holds 50 Diskettes With Lock	~~$30.95~~	$33.95

VIDEO 300
by Amdek



VIDEO 300 (Green): 13" Non-glare screen.

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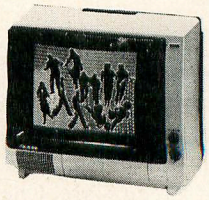

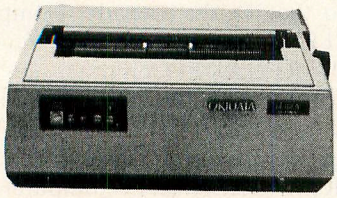

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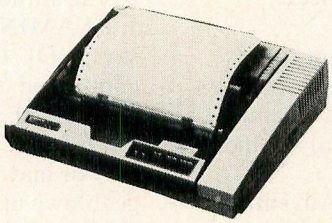

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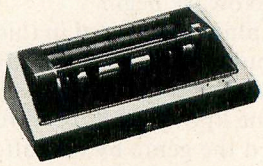

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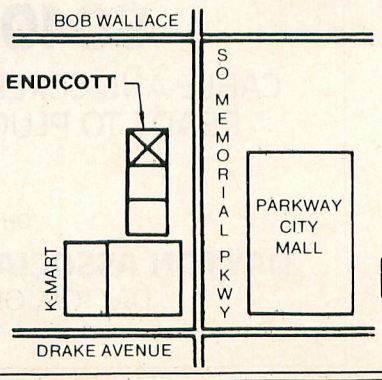

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The classic style is easier to swallow. A classic is usually goal oriented with pieces of the puzzle scattered about and fitting neatly together to form a solution. The text Adventure *Dragonquest* occupies this opposite end of the scale from the frustration (challenge) of high tech. Users can easily tune in the young Charles Forsythe as he guides them through Lower Graylockland in search of Smaegor the Princess Snatcher. He has provided tools for the win, without denying all but the most clever access. Instead, he makes the overall problem, rescuing the princess, the most difficult. The tools needed are sub-puzzles simply solved. There are a few tense moments at the beginning when the King refuses to allow the player to leave the castle. But the keywords can be worked out without the help of a Harvard professor. By the way, what is a MANATEE? And would you go swimming in the same river with one?

The flip style or the irreverent style, if you prefer, employs elements of the other two. Gamster Software's *Madame Rosa's Massage Parlor*, which is about as naughty as a bikini calendar, provides endless word twists and blind alleys caused by letting the imagination run wild. But, at the same time, it is very classic in its goal orientation. *Madame* is tough, but not unwinnable. More importantly, it is 16K of belly laughs. Author Bob Krotts pokes fun at the whole Adventure genre and gives the player something to do other than slay dragons or escape deadly traps.

Each of the three styles mentioned makes specific demands on the audience. High tech requires literal interpretation and cunning logic, an almost telepathic draw on the author's intent. Classic is more story oriented with goals plainly defined. Flip plays to the sense of humor and the user's willingness to be manipulated ot led astray in the name of comedy. The later two can be won with effort and patience. The first requires an iron will, a master's in parapsychology and a loving, understanding family. A strong local mental health office should be a consideration also.

There are roughly 10 Adventure titles for every "Twitch" (arcade game). This is attributable in part to the ease of coding and divergence of thematic possibilities, versus the logistics of animation. Not all of these make it to market. There can be found on BBS's and in private uploading clubs tens of hundreds of Adventure programs placed in the public domain by first authors anxious for approval from their peers.

Commercially, the variety is overwhelming. *Calixto Island* from Mark Data shares the line with several highly animated and well-planned programs. Prickly-Pear's *Adventure in Wonderland* employs the still experimental sentence-style command mode and explores a very popular classic children's story. *Sands of Egypt, Black Sanctum, Dragonquest, Beyond the Cimeeon Moon*, the list reads on and on, like the titles in a fiction library, each trying to outdo the other in cleverness and plot.

Beyond all this, whether the program is illustrated or pure text, you will find the written word. The bottom line in Adventure is reading comprehension. I believe, based on this fact alone, that Adventure is the ideal computer game for kids (and adult alike). Even with all the motor skills that are developed with the Twitch, there can be no more valuable exercise to anyone than reading. For the micro-computerist gamester, there can be no challenge greater than that of one mind pitted aganst another; no teamwork more satisfying than friends, as a group, solving a killer puzzle.

And what of Joe Adventure?

It's five o'clock in the morning. Joe has to go to work at nine. He's taken the sword from the stone. He knows where the dragon is hiding, He's even made it through the dark woods. But the HELP command's been giving conflicting answers all night. The coffee's cold, he's been in the river twice and a question burns in the gray of the pre-dawn.

"Pray tell me, Sir Author," he laments, "what DOST thou feed to a MANATEE?"

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The following products have been recently received by *the Rainbow*, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

The Answer, a hardware device that plugs into your ROM port. It features: ROM Pack port splitter; auto-execute and select switches; an LED indicator; parallel I/O ports; parallel printer driver; COCOTERM (a built-in smart terminal program); and a built-in color monitor. Midwest CoCo Systems, 1800 W. 91st Pl., Kansas City, MO 64114, $179.95

Atom, a 16K Program Pak, designed to introduce your child to the exciting subatomic world of elements. The object is to build an atom of each of the 54 elements available in the game as quickly as possible. At the same time, your child will be learning the name of each new element, its atomic number and configuration, and its main property. As the player improves and completes the structures of the atoms, the atoms become more complex and less time is given to construct the next atom. Radio Shack stores nationwide, cat. number 26-3149, $19.95

BASIC Made Easy, by Don Cassel and Richard Swanson, a 240-page guide to programming microcomputers and minicomputers. This book is an introduction to BASIC at the level of the first time user. It assumes no background in either computing or programming and begins by introducing the reader to the various components of a computer system. Features include: an introduction to mini-and microcomputers; using flowcharts to solve programming problems; BASIC programming fundamentals, etc. Reston Publishing Company, Inc., 11480 Sunset Hills Rd., Reston, VA 22090, $15.95

CoCo-Bingo, a version of the popular game of Bingo which is designed to run on the CoCo, TDP100 and Dragon computers. Includes playing cards and plastic chips. You can play regular Bingo, Double Bingo (two Bingos on same card) or Coverall Bingo. Colortech Systems, 17401 Darmouth Ave., Cleveland, OH 44111, tape $12.95

Colorcom/E Smart Terminal Package, a package which includes: Mini Modem Model MM-100; a CoCo RS-232 modem cable; and the Colorcom E. The Mini Modem is a self-contained FSK (frequency shift keying) telephone interface that allows computers to communicate with each other over ordinary telephone lines. It is compatible with all Bell 103-type modems. Features include: sending/receiving at 0-300 Baud for compatibility with most time-shared computer systems; selectable originate/answer mode for operation in "remote" or "host" terminal applications; full duplex operation which allows simultaneous communication between modems, etc. The package also includes the **Colorcom/E** — a smart terminal program that uploads and downloads files. The **CoCo RS-232 modem cable** is also included. It is a 4-Pin din to a DB 25 plug. Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, $114.85

Color Designer, a graphics processing tool to create graphic characters, shapes, and especially to create entire graphic screens. It includes an eight-key cursor control with key repeat, a *FILL* command that paints the screen with more than 1000 different color/texture combinations, and much more. Color Connection Software, 1060 Buddlea Dr., Sandy, UT 84070, tape $26.95, disk $28.95

Colorsoft Accounts Receivable, a full stand-alone accounts receivable system. It is suited for the **Colorsoft Small Business Accounting Package.** This program provides the user with detailed audit trails and history files on all transactions by a customer. It also prepares invoices, mailing labels, aging lists, customer history reports, and an alphabetized customer listing. The user can define discount/net terms for commercial accounts and finance charge and minimum payments for revolving accounts. Requires 16K and a single disk drive. Brantex, Inc., Color Software Services Div., Business Software Group, P.O. Box 1708 Dept. R, Greenville, TX 75401, $89.95

Colorsoft Payroll, a complete stand-alone package for maintaining personnel and payroll data on the employees of a small business, calculationg payroll and tax amounts, and maintaining year-to-date totals for income tax reporting. This system will compute each pay period's totals based on hours worked, calculate taxes to be withheld, allow for specified deductions, compute net pay and prepare a mailing list. Additional reports that are produced include a listing of employees, a year-to-date federal/state tax listing, and miscellaneous deductions. It is also suited for integration into the **Colorsoft Small Business Accounting Package**. Suited for use in all states except Oklahoma and Delaware. Requires 16K and a single disk drive. Brantex Inc., Color Software Services Div., Business Software Group, P.O. Box 1708, Dept. R, Greenville, TX 75401, $99.95

Colorsoft Small Business Accounting, an integrated, ledgeriess accounting package for a small business that includes accounts payable, accounts receivable, sales and purchase order programs. Outputs of the system include an income statement, balance sheet, check register, accounts payable and receivable status lists, and accounts payable and receivable aging reports. During each user established accounting period (monthly, quarterly, annually, etc), it will handle sales of up to $1,000,000 and approximately 800 accounts payable (receivable). Requires 16K and a single disk drive. Brantex, Inc., Color Software Services Div., Business Software Group, P.O. Box 1708, Dept. R., Greenville, TX 75401, $149.95

Compucards, computerized greeting cards. Use your computer to send a personal message to everyone on your Christmas list. Includes 20 illustrated, colorful cards and envelopes. Compucards, P.O. Box 894, Stone Mountain, GA 30086, $9.95

The Computer Phone Book by Mike Lane, is a comprehensive paperback directory of all online databases for personal computer users. This 466-page guide is a complete annotated listing of names and numbers so you can go online with over 40 systems across the country. It features free software, electronic mail, computer games, consumer catalogs, stock market reports, medical data, dating services and more. New American Library, 1633 Broadway, New York, NY 10019, $9.95

Christmas Quiz, a true/false, multiple choice question and answer game. This educational program is based on the gospel's account of the virgin birth of Jesus Christ (Matthew and Luke are the major sources). Quality Chistian Software (QCS), P.O. Box 1899, Duncan, OK 73533, tape $9.99

Crazy Painter, a ML arcade game for the Dragon 32 with eight skill levels. Paint the floor, but look out for dogs, snakes, painters' mates, paint eaters and turpentine bubbles. Microdeal LTD., 41 Truro Road, St. Austell, Cornwall, PL25, 5JE, tape $12

Cuthbert Goes Digging, a ML game for the Dragon 32. Fight the Moronians on the galactic building site. Microdeal LTD., 41 Truro Road, St. Austell, Cornwall, PL25, 5JE, tape $12

Cuthbert In The Jungle, a ML arcade game for the Dragon 32. Fight your way through the jungle collecting treasures, jumping pits and swinging across alligators while being aware of the killer scorpion in the basement. Microdeal LTD., 41 Truro Road, St. Austell, Cornwall, PL25 5JE, tape $12

Diskette Carousel, a compact, mini-floppy storage system that organizes up to 72 mini-floppies in protective, color-coded envelopes. Envelopes slip in and out of individual slots in carousel with ease. The precision rotary movement provides easy access to all flop-

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pies in a matter of seconds. Inland "Data Pak" Corp., Madison Heights, MI 48071, $29.95

Education Pack 2, a 16K or 32K three-package program (to be used with **The Voice** hardware speech synthesizer) intended for the elementary school child. Includes *Hangman* — **The Voice** adds a new dimension to this spelling game; *Spelling* — Test your spelling ability with **The Voice;** and *Calendar* — Test your knowledge of the days of week, months, etc. Speech Systems, 38W255 Deerpath Rd., Batavia, IL 60510, cassette or disk $24.95

Esther, a 32K machine language program (to be used with **The Voice** hardware speech synthesizer), which illustrates the high level of artificial intelligence computers have achieved. This is a similar version of *Eliza*, a program developed at MIT in which the computer plays psychologist.Speech Systems, 38W255 Deerpath Rd., Batavia, IL 60510, cassette or disk $24.95

Filebox/16, a home filing system for the 16K CoCo and a disk drive. Create, change update, delete, sort and list files you define. Applications are virtually unlimited. Use for address lists, car repair records, household inventories, book and record collections, tax records, etc. You can also use it to sort mailing labels. Each record can contain up to 10 fields and 256 characters. It is completely menu-driven and contains a 20-page user's guide. Circling Star Software, P.O. Box 1218, Freehold, NJ 07728, $29.90

Galactic Taipan, a 32K ECB space strategy game. As a trader, you must battle space storms, pirates and high taxes in the hopes of making a profit in the galaxy. Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, tape $24.95

Graphic Screen Print Program (GSPRB), a 16K/32K program for use with the TRS-80 Color Computer and **Gorilla Banana Printer.** Requires an eight bit serial interface—no print driver included. Custom Software Engineering, Inc., 807 Minuteman Causeway (D-2) Cocoa Beach, FL 32931, tape $9.95

Intergalactic Force, a ML arcade game for the Dragon 32. You are in charge of a starship and your mission is to destroy the alien invaders. Microdeal LTD., 41 Truro Rd., St. Austell, Cornwall PL25, 5JE, tape $12

Keys Of The Wizard, a ML Adventure game for the Dragon 32. This Adventure is randomized so that no two games are ever exactly the same. Find all the treasures and store them safely in the sanctuary, while fighting off the creatures which can attack anytime, and avoiding traps and tricks. Microdeal LTD., 41 Truro Rd., St. Austell, Cornwall, PL25 5JE, tape $12

Learning BASIC Fast, (revised edition) by Claude J. DeRossi, a 211-page, easy-to-read guide emphasizing simple, concise explanations of computer systems, flowcharts, and the important commands used in BASIC. This book teaches a beginner to learn the language of BASIC in 12 to 15 hours. It provides exercises, definitions and sample programs. Reston Publishing Company, Inc., 11480 Sunset Hills Rd., Reston, VA 22090, $15.95

Musica, a machine language, four-voice music program which automatically adjusts to 16K or 32K machines. Features: the notes are displayed on the screen in Hi-Res graphics; treble and bass staffs are shown individually; notes are input using keyboard arrow keys or joysticks; you can develop an unlimited number of timbre definitions using a superfast waveform synthesis option, etc. Speech Systems, 38W255 Deerpath Rd., Batavia, IL 60510, tape $34.95, disk $39.95

Ockywoky, a 32K ECB game. There's a double-agent in the organization code named Ockywoky. Your job is to identify him/her but it won't be easy! You don't have much time and it can be any one of 32 suspects. Travel to exotic capitals, contact informants, scrutinize dossiers . . . all in your quest. Includes dossiers and suspect check-off pad. Shooting Star Software, P.O. Box 24, Chico, CA 95927, disk $24.95, tape $22.95

Quiz All, a versatile quiz program which provides study and test formats and allows printing of quizzes. It also includes an option for the computer to generate multiple choice answers. Color Connection Software, 1060 Buddlea Dr., Sandy, UT 84070, tape $18.95, disk $20.95

Starblazer, a 32K ECB galactic strategy game. During your absence, the Spectrum galaxy has been overrun by the draconic xyclons. Now you command the only starship left to destroy all invaders: xyclon patrols, vessels and mother ships. Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, tape $24.95

The Translator, a machine language program (to be used with **The Voice** hardware speech synthesizer) that uses a sophisticated algorithm and exception table to automatically convert text to speech. **The Translator** will even allow you to type words in one language and have **The Voice** speak in another. Includes *Reaction*, which tests your reflexes as **The Voice** gives you commands; and *Simon*, which tests your memory for numbers spoken by **The Voice**. Speech Systems, 38W255 Deerpath Rd., Batavia, IL 60510, cassette or disk (including above described programs) $29.95

TRS-80 Program And Applications For The Color Computer, by Al Baker, a handy 187-page guide for personal computing applications. Using this book, you can learn to play games on your TRS-80 CoCo, balance your checkbook, or keep track of important household and business information. This book is also designed to sharpen the programming skills of the experienced user. Reston Publishing Company, Inc., 11480 Sunset Hills Rd., Reston, VA 22090, $14.95

Vector Addition, (part of the Computer Assisted Instruction series) is an educational courseware package that allows secondary students to study vector concepts on the microcomputer. The program was written in an effort to help students master the concepts without overemphasizing the mathematics involved. It assumes that students have been introduced to vectors, including addition by the tip-to-tail method and addition by the parellelogram method. Topics include: fundamentals of vectors; displacement; velocity and acceleration; force; gravitation; conservation of momentum; and electric forces and fields. Radio Shack stores nationwide, cat. number 26-2638, 16K tape $39.95

VIP Database (formerly **Super "Color" Database**), a 32K disk, high speed ML program which fills all your information management needs, be they for your business or home. Features include: machine code, lowercase screens, mail merge capabilities, inventory, accounts, mailing lists, family histories, etc. It also sorts and merges with *VIP Writer* files. Your data is stored in records of your own design, each divided into up to 255 fields. Each field holds up to 255 characters. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. You may also combine files, sort and print mailing lists, print "boiler plate" documents, etc. The math package even performs arithmetic operations and updates other fields. It also features the Mini Disk Operating System. Softlaw Corp., 9072 Lyndale Avenue South, Minneapolis, MN 55420, disk $59.95

The Voice, a hardware speech synthesizer that plugs into the Color Computer's cartridge slot. It uses the sophisticated SC-01 by VOTRAX to reproduce any word. Speech may be heard through the TV speaker or the built-in audio power amplifier with volume control may be connected to your own external speaker. It comes assembled with all the necessary hardware. Runs in 16K, 32K or 64K computers. It includes *Math Tutor* — **The Voice** tutors your child in arithmetic; *Bingo* — **The Voice** announces the bingo tiles while you play; *High Low* — **The Voice** gives you hints in guessing a number it has picked; and *Editor* — This will help you develop words phonetically. Speech Systems, 38W255 Deerpath Rd., Batavia, IL 60510, hardware and programs above — cassette or disk $79.95, 40-page manual for evaluation $4

The *Seal of Certification* program is open to all manufacturers of products for the TRS-80 Color Computer, the TDP-100, or the Dragon-32, regardless of whether they advertise in *the Rainbow*. By awarding a *Seal,* the magazine certifies the program *does exist*, but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to *the Rainbow's* reviewers for evaluation.

—Susan Remini

REVIEWS

TALKING SPELLER

Editor:

I must reply to H. A. Manning's response (November, p. 237) to my review of "Talking Speller" (September, p. 199).

Marshall McLuhan warned that we must avoid approaching new media and technologies "through a rear view mirror," pouring the obsolete content of the old into the new, ignoring the potential of the new for original ideas and messages. The "rear view mirror" phenomenon is taking place in a great many educational programs written for the Color Computer.

Research in the learning of spelling shows that even youngest children, drill in words taken out of context does not produce language mastery with much efficiency. This is not a matter of "philosophizing," as Manning phrases it, but of *fact*. A computer program that merely replaces a teacher but still teaches rote mastery of spellings is, therefore, suspect on very real pedagogical grounds. I believe it is the duty of the reviewer to point out pedagogical weaknesses in educational programs written for the Color Computer. It is not enough merely to plug in the program and to attest that it runs smoothly. A badly conceived program must be identified as such, even if it runs to perfection.

As an educator, I am concerned first with the quality and secondarily with seeing home computers can move education forward. As a reviewer — for *Rainbow* or any other magazine — I will continue to point out misuses of computer technology when I perceive them.

Stephen N. Tchudi
Okemos, MI

BIO DETECTOR

Editor:

I would like to respond to *Rainbow's* review of Computerware's *Bio Detector*. First, it is not a game! The *Bio Detector's* primary purpose is for biofeedback using galvanic skin response. We have several institutional customers using their CoCo and *Bio Detectors* in special biofeedback programs. A game program called *Anxiety Attack* is included for fun and reportedly has been a big hit at many parties.

Secondly, the *Bio Detector does work*! The most common comment we have received from customers is how sensitive it is! Of the many hundreds of *Bio Detectors* sold, we have not received a single one returned. I am disappointed to see that a reviewer with the responsibility of thoroughly investigating a product for your readers would not even contact the manufacturer concerning the attitude of this reviewer and rely on the reputation for quality that the Computerware label represents.

Sue Searby
Computerware

LOWRCASE

Editor:

Here is a review of Ed Lowe's review of the *Lowrcase* descenders program for the Radio Shack DMP 100 printer (from KRT Software). He obviously expected some criticism, having so stated in his review. Here it is: If a review on any product is to be published, there is a responsibility to readers to be objective and thorough.

If the reviewer had tried *Lowrcase* with Telewriter 64 he might have been quite pleased with the results. The DMP 100, *Lowrcase,* and Telewriter 64 are used in my business (writing and formatting resumes). When my typesetter complained about the lack of descenders on resume draft layouts, I ordered the *Lowrcase* from KRT. Frankly, the first two tapes failed — but KRT not only stood behind its product, they sent me the flight simulator program to compensate for my troubles — and, by the way, that program is fantastic!

The descenders program works extremely well and, contrary to popular belief, does work at the 1200 Baud rate. There is not an objectionable printing slow-down (as compared to printing time without the descenders program). Finally, the results are infinitely better than *not* having descenders print. I am no longer ashamed to use the DMP 100 for correspondence purposes!

Is the descenders program worth it? Lowe says not. I say, from the perspective of a businessman, it most assuredly is; $15.95 is considerably less expensive than buying another printer with built-in descenders! Shame on you for printing an incomplete review. I trust future reviewers will be more thorough in trying and reviewing products.

C.J. (Bucky) Helmer, Jr.
Binghamton, NY

Editor:

I would like to comment on a review made by Ed Lowe in the December 1983 issue about KRT Software's *Lowrcase Descenders* program. I had purchased that program myself for my LP-VII (now sold) and was very pleased with it, although it was rather expensive. What exactly did he expect for $15.95, a hardware mod? It, by the way, does not double space but rather gives a sort of 1½ spacing which I find better than the original. The program thus gives 49 lines per page instead of 66. I agree it was slow, but what did he want?

Paul Gani
Marshfield, WI

Editor

Boo, hiss, on Mr. Ed Lowe's review of the *Lowrcase* program. The review is located on Page 262 of the December, 1983 *Rainbow*.

I have been using the package almost daily since it was sent to me July 22, 1983. I am very pleased with the results. I use it in conjunction with a *Telewriter-64* program for output on a DMP-100 printer. As stated by Mr. Lowe, "it was the most I could afford . . ." The *Lowrcase* program has allowed my DMP-100 to move into the word processing world "of the 'bigger' dot-matrix printers with true descenders," as a result of the new character set style afforded by this program.

At the church, I use the system weekly to send out letters to visitors and I also use it to support various organizations in the church with "form letters." There have been no complaints! To date that includes both the editor and my son's test grades.

Granted, what Mr. Lowe indicates about throughput is indeed true. It does require almost twice the time to print a line, since two passes are required. The vertical spacing is not quite double, however. My 11-inch form under *Telewriter-64* now has 49 lines instead of 66. In addition, there is a little more vertical spacing on my program printouts which really improves their readability.

Not only do I feel the package is well worth the $15.95 price, compared to the cost of real descenders on a matrix printer, but I have *never, never* had it cause any system problems, nor produce unexpected results. That's high reliablity.

Now that I've said the above I feel that I must editorialize just a bit. Mr. Lowe's review and my rebuttal simply illustrate a very salient point in the software world: the ability of a software offering to perform the task which the purchaser wishes to perform, at a price he wishes to pay to have the job done. Those who achieve the desired results are happy. Those who feel the offering does not meet their expectations are unhappy. The key word here is the word "expectations." Unclear advertising, half-truths, and sales "hype" all contribute to establishing the expectations for a software offering.

Sometimes the expectation is extremely false. The real caveat becomes "try it, you'll like it"... or maybe you won't! But you'll probably have to try it to be sure.

One other quick note. On two occasions I have had the privilege to discuss program problems with the proprietor of KRT Software, Mr. Ken Elder. The first occasion was a result of changes made in *Telewriter-64*. The second was concerning his program and a spooling application. This brings up the subject of "support" after purchase. Let me just say that, in both conversations with Mr. Elder, I found him to be honestly interested in my problem and eager to assist me in developing a solution. With individuals such as him writing and selling (and *servicing*) software the marketplace will *never* be "caveat emptor."

Keep up the fine magazine. It's the best CoCo magazine on the shelf! Please include more OS-9 information for those of us who have purchased this fine operating system from Radio Shack.

Bob Hawkins
Brushy Creek Baptist Church
Round Rock, TX

Editor:

While I hold no special interest in KRT Software, or in the *Lowrcase* program, the review was somewhat disturbing to me.

The reviewer made a statement that he did not even try the program with the Cognitec Telewriter-64 text processing program. To anyone who has used the *Lowrcase* program, it is obvious that *Lowrcase* was written principally for that purpose. Thus, the reviewer in his lackadaisical approach seems to have completely missed the major point.

What disturbs me is this: is this the normal method used in reviewing products for your magazine? Is it usual for a reviewer to do only part of the job of testing a product? If so, then you are doing a poor service for your readers. Better no review at all than a job only partly done.

My immediate reaction to this particular review is that I am now somewhat distrustful of all the product reviews which you print.

R.K. Landrum
Birmingham, AL

Editor:

I just finished reading the December review of KRT Software's program *Lowrcase*, and was immediately prompted to write you. Having recently received my copy of *Lowrcase*, I could not believe what my eyes were reading in *the Rainbow*.

At least the reviewer was honest enough to admit that he never used the program with Telewriter-64. I am bothered, however, by someone who would pan the work of another in a major publication without doing his homework, and then have the nerve to admit it. Not only am I pleased with the KRT product, as you can tell from the print obtained with my DMP-100, but I would also like to add a word of praise for the people at KRT as represented by Mr. Ken Elder. I have found Mr. Elder to be a very helpful and concerned individual who will cheerfully spend time with his customers to assist them in their use of a software product new to them.

As always, three cheers for *the Rainbow*, *the* magazine for the Color Computer.

Ted Gundersen
Valhalla, NY

CC-DBM/LW

Editor:

The December issue of *Rainbow* carried a review of *CC-DBM/LW* on Page 268 by Gerry Schechter. I read this review as part of reading your great magazine from cover to cover as I always do.

Based on the review and my need for an easy way to crank out a short letter to one person or a group, I decided to purchase this software from EVS Engineering.

In the EVS Engineering ad on Page 9 it says "Personal checks — OK we won't make you wait." Let me tell you what that means. On November 21 I sent EVS a discount coupon and a personal check for $31.95 (includes $2 for shipping and handling). The EVS invoice indicates they processed the order on November 23, and sent the software to me on the same day priority mail at a cost of $2.58, I had the software on November 26. Who can ask for more than that for service?

Now, about this EVS software that I purchased. Gerry Schecter's review is very accurate, "If you are in the market for a full-blown database or word processing system, then you should look elsewhere." I know this to be true because, based on another *Rainbow* review, I purchased *Telewriter-64* some time ago. Now, *CC-DBM/LW* is not *Telewriter-64*, but, it is just as great in its own way.

To sum it all up, good review, good software, good value and as usual, good *Rainbow*. By the way, this letter was done using EVS Engineering's *CC-DBM/LW* software.

Joseph G. Hardy
Rockville, MD

SONAR SEARCH

Editor:

I am an author for Shell Software, and I wrote the program *Sonar Search* which was reviewed in the November 1983 issue of your magazine. I was pretty satisfied with the review except for one thing. The reviewer stated that he got a very negative reaction to the price of $18.95 for a program written in BASIC. In my opinion, that is simply absurd! First of all, would rewriting the game in machine language justify the price? Remember, as stated in the review, *Sonar Search* is not a high speed shoot-em-up, and it wasn't meant to be, therefore machine language wasn't needed. Secondly, $18.95 is *not* a high price to pay for a game since many games cost $25 to $35. I can see charging a *little* more for a machine language game over a BASIC game, since a machine language game usually takes longer to write, but not as much more as is implied in the review. Otherwise, I feel it's like paying an employee more or less than another employee on the basis of race or sex. As long as the employee does a good job, who cares about the race or sex of the employee? Likewise, as long as the game is good, who cares about the language the game is written in? In fact, when I see a game advertised for a very low price, I begin to wonder *why* it costs so little.

The reviewer seemed to think that the packaging was the culprit for the "high" price. Well, let me tell you that after the price of the cassettes, printing of the instructions, artwork, and all of the time that goes into writing the program are considered, the price of the packaging has very little effect on the price of the game. In fact, all games from Shell Software are packaged like *Sonar Search* because we got a low price on a large quantity of the packages.

Since I am on the subject of reviews, let me tell you about an idea that I have for reviewing programs. You see, your magazine is the largest magazine dedicated to the CoCo. Therefore, the opinion of one reviewer on your staff will probably determine, to a large extent, whether the program reviewed will sell or not. I do not consider this a fair system because opinions can vary greatly from one person to another. An example of this goes back to the packaging of our programs. The reviewer of *Sonar Search* didn't seem to like our packaging much, but the reviewer of *Death Star* (also by Shell Software, reviewed in the April 1983 issue of *the Rainbow*) was impressed with it. This is actually a trivial matter since it has nothing to do with the game itself, but it illustrates a difference of opinion. Since opinions can vary so much, I feel that two people should review each program, possibly with opposing views so each reviewer could point out what they did or did not like about the program. Otherwise, I feel you have a great magazine.

Bob Schmerling
Winter Springs, FL

Valhalla — A Very Good War Game For The CoCo

By Tom Roginski

I have played all types of war games starting with the old board game "Gettysburg" and continuing to the modern computer war games of the present. The Apple and the Atari have had true war games for some time; the CoCo only recently. *Valhalla* is a fine recent entry which does qualify as a true war game. It also has the addition of some fine graphics. As with all such games, the rules are not simple. I will present the basic flavor of the game without giving complete details.

Valhalla is a board game played between two teams with the computer acting as the scorekeeper, map maker, and judge. This approach makes for a much faster game than similar games do without the computer. More moves can be made in a given period of time and no time is lost with disputes between players. Each team consists of one or two players who are in command of various armies and officers. Each team starts with two lords, two generals, four captains, and eight armies consisting of five swordsmen, five archers, five light cavalry, and five heavy cavalry units each.

While each team starts out even, the way the forces are used determines the final outcome of the war. These forces must be moved around the field where various castles, villages, mountains, marches, rivers, and river fords are placed. Castles must be used for defense and to gain replacements for forces lost in battle. Villages must be used for supplies. You start out with five turns of supplies and must pass through a village to obtain more supplies or you will suffer a loss of men. The only way to make an aggressive attack into enemy territory is to either stock up on supplies or to capture an enemy city.

The strength of each type of unit in combat is determined by the unit's basic strength modified by several factors. The strongest basic unit is the heavy cavalry and the weakest are the swordsmen and archers. Basic fighting factors of the units are modified depending on terrain. Heavy cavalry has its basic strength increased in the open or on a road while it is decreased in a ford or other bad ground. In the rough, light cavalry is actually better than heavy. The designers of this game have done a good job researching the tactics of land warfare. By careful use of the terrain, a weaker unit can defeat an otherwise more powerful one.

There are two basic types of graphic screens used in this game. The usual screen is the map. This screen is an excellent, Hi-Res picture of the battlefield. On this screen the terrain, villages, and castles are shown. Included with this game are two different map setups or scenarios. More scenarios are promised in the instruction sheet. Scenario One is rather even with the two sides of the board almost, but not quite, mirror images. Most of the play between evenly matched players might be made in this scenario.

Scenario Two has the two sides of the board rather different. The blue side (which moves first) has a terrain greatly cluttered with rough ground, marshes, and other movement problems. This works to the disadvantage of the blue player giving him or her problems in moving. One portion of the force located behind the lake is especially difficult to move into action. The terrain also works to some advantage of the blue player by making it difficult for the red player to get around the board to attack. If the players are greatly different in playing ability, giving the weaker the red side in this scenario will give him a chance to get used to the game and to set up a defense.

The other type of screen used in this game will lead me to describe what is probably the game's only flaw. A battle begins after any movement phase in which two opposing armies are moved in contact with each other. The two sides are then represented as four Hi-Res symbols for each of the four types of military forces (swordsmen, light cavalry, heavy cavalry, and archers). A number is then placed along the symbol to indicate the number of this force remaining in the army. The attacking player and then the defender each place six units on the front line. The officer of each side is then placed. At this time, the computer puts these symbols in the proper position and starts the generation of random numbers.

Each unit is played against the unit in front of it. After each unit is played the loser is removed from the board and the players are asked if they want to retreat. If a side wishes to retreat, it may do so automatically and without additional losses. It may be only my opinion, but I do not agree that no retreating forces should be lost. Because of the lack of

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communication in medieval and ancient warfare, major losses can occur during a retreat.

It is when more than two opposing armies are in contact that the game shows its only flaw. The battle board only has the ability to show one army against another and each unit against only the unit placed in front of it. When the attacker or the defender have more than one army, the other force is not used in the first battle. All battles are one army against another. The additional force must fight after one of the first two armies have been eliminated or retreats. If one player has only two units left and cannot retreat, his two units do not have to fight more than the two units directly in front of them. In the history of war, the principle of bringing all possible force to bear against a single point is of prime importance. This principle must be employed here by using the terrain factors to advantage. A force cannot retreat with a river or lake behind it. You can attack with one unit until it is reduced to a certain level, retreat it, and then attack with the second unit.

One additional refinement should be mentioned. If an army is in a castle, it has the choice of coming out of the castle to attack or to stay in and accept a siege. If the defender stays in the castle, the attacker can try to ram to force a battle. If the ram fails, both sides lose a small number of units and the attack stops. During the siege, the force in the castle is not reinforced or resupplied. This siege feature is a nice refinement.

A point system is used for the determination of the victor. Each player starts with 200 points and then gets more points for the destruction of enemy units and loses points for the loss of officers, castles, and villages. At the beginning of the game the players decide how many turns the game will have. A short game usually would result in an attempt to destroy as much of the opposing force as possible while a longer game will include the consideration of supplies and reinforcement.

Incomplete games can be saved to tape. This is done by pushing the right joystick button instead of the left joystick button when the scorecard is shown. Use caution when the score shows because if you push the wrong button (which I did several times) the computer will attempt to save instead of going to the next turn. I have found that if the game stops after an accidental attempt to save, it is usually possible to get back to the game without any changes by typing: *GOTO3* [ENTER]. This might be interesting if you wish to try two different ways of completing a game from a specific position.

The instruction sheet that comes with the game is adequate. It gives a good, clear description of the game and the rules. Its appearance is not the best, being a copy of a Line Printer VII printout.

This is a very good game. Although the way the battles are decided between unequal forces is not as I would like, this is one of the best war games that is available for the Color Computer. It is also one that would be considered a very good war game and graphic display for any computer. The minor exceptions that I have taken with the game are probably partly due to the length of the game. There is no room for the disk system. With the disk removed, I typed *PRINT MEM* and found only 285 bytes left on my 32K CoCo!

(HYCOMP Software, P.O. Box 15331, Tulsa, OK 74158. $24.95 in 32K tape version.)

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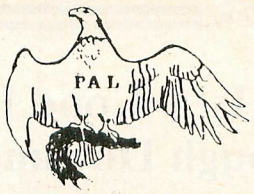

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Dyterm Is A Good Program With Tough Documentation

The material says you can convert your CoCo into a "smart terminal" inexpensively using *Dyterm*. While that is so, they ought also to have another program to create a "smart terminal operator."

Dyterm works, it is user modifiable, you don't have to have Extended BASIC, and it does most of what is says it will, but you have to be sharp to find out how and why. If you know nothing about terminal programs, the documentation for *Dyterm* may leave you that way. The four-page document often opens interesting questions, but does not give what I call adequate directions.

As an instance, the neophyte may not quite understand the designation of a data block as outlined in the documentation. It would take only a few more words to clear up this matter. An attempt is made on Page 4 of the document, but I think it needs to be more specific.

There is a need to prepare cables if you are using the program between terminals. There is a description of these in the documentation, but nary a hint if you can purchase a ready-made cable or how to go about making one. I am saying it is a good idea to be more specific about terminals and terminal programs.

I think sometimes software authors just automatically think everybody knows everything about computers. It would be nice if they were right, but more and more people are button pushers, and you have to think of them.

None of this will detract from the fact the program does convert your CoCo into a terminal and will change Baud rates (300 to 2400) and stop bits and all the goodies.

It loaded right up from the tape and ran like a bandit in the tape mode. After *PCLEAR2ing*, the tape was excellent quality with no problems. Just to make sure, I loaded a version onto disk using the tape to disk program from Tom Mix, which has been my good right arm.

Since *Dyterm* is a BASIC program with machine language routines generated by BASIC, there is no problem of a start, end or transfer address. It loaded to disk just fine and runs like a bandito. (That is, quicker than tape!) The program will drive my Radio Shack Modem II, and I was able to raise Bob Rosen's B.B.S.

You have to toggle between send and receive by hitting the [SHIFT] and the down arrow. I got that all mixed up and only got as far as where Bob asked me my first name before I blew the transmission out the window. It was my fault, but I am like many other first users.

When I was cranking the program up, I called Bill Chapple of Dynamic Electronics to discuss the program and ask what he thought it was all about. He is a personable guy and ready to answer your questions and learn from what you have to say.

The text entering capability and preloading are a real plus on this program. There is no provision for storing the text from the buffer, but you should be able to remedy that matter since the program is in BASIC and you could fit the routine in if you wish.

There are many merits to this program, not the least of which is low cost. I have a couple of terminal programs which are easier to run, but then again, I laid out quite a few more beans to purchase them.

Dyterm also comes in cartridge form, which I did not operate. The tape/disk version is $14.95 and the cartridge sells for $24.95.

A serious programmer who knows what is happening will like this program. Someone new to the computer world might need some help.

(Dynamic Electronics Inc., P.O. Box 896, Hartselle, AL 35640, $14.95 tape, $24.95 cartridge)

—Howard Lee Ball

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Ice Master: A Refreshing Change Of Pace

Ice Master, by Arcade Animations, Inc., is a simple but colorful game with good graphics and sound. In *Ice Master,* the player does not assume any fantasy role identity such as commander of an inter-galactic spaceship. It's you against an assortment of computer-generated menaces in a fast-moving battle to destroy or be destroyed. Your only enemies are mosquitoes and your only weapons are blocks of ice.

You begin the game surrounded by a number of mosquitoes, depending on the level of difficulty you choose. These disease carrying insects swarm the screen, melting your only defense device—the blocks of ice, while they seek to extract your blood to destroy you. You are a little man in the opening screen, hiding in a center safety box, patiently waiting for a clear way out. There are approximately 50 randomly arranged blocks of ice surrounding you. Your only objective: To survive by sliding the blocks of ice into the mosquitoes and avoid getting stung.

The object of the game sounds simple. However, the mosquitoes move at an extremely quick pace. You control movement of your man with the right joystick and move the blocks of ice by pressing the fire button which pushes the blocks into the mosquitoes. There is also a bonus timer at the top of the screen. The timer starts at 7,500 points and decreases in increments of about 100 points per second. Therefore, you have approximately 75 seconds to crush all of the mosquitoes on the screen to obtain any bonus points.

Points are obtained by either crushing a mosquito (100 points) or by melting blocks of ice (25 points). Blocks of ice can only slide one at a time and will melt if pushed when another block of ice is adjoining. The faster you destroy all of the mosquitoes on the screen, the higher your bonus score. After completing a screen, you simply start the screen over, with the only difference being a different arrangement of blocks of ice.

Ice Master is a deceiving game whose concept is so original that it defies classification. There aren't many different enemies attacking, but the mosquitoes are fast and very smart. The blocks of ice are your only defensive weapon in the game in addition to your craftiness of forming the blocks of ice.

I found *Ice Master* to be a refreshing change of pace from the run-of-the-mill shoot-'em-ups. Forget about spaceships, laser beams, and firing rockets. Just watch out for those nameless mosquitoes that flit, skitter and swoop around on your CoCo screen. Its originality and fast-paced action were the first things to capture my attention.

(Arcade Animations, Inc., 21 The Fairway, Upper Montclair, NJ 07043, 32K disk, $26.95, 32K cassette, $24.95)

—Jutta Kapfhammer

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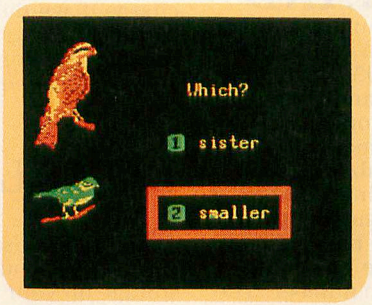

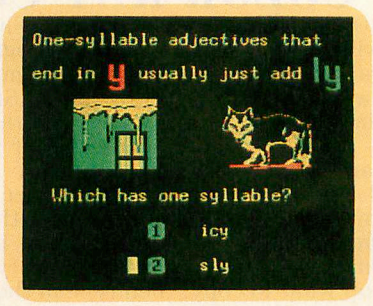

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*Disk and Rom Pack only (not on tape). PRICE: $29.95 (TAPE) $39.95 (ROM PACK) $39.95 (DISK)

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GALACTIC MATH is not like any other math tutor program on the market for the Color Computer! This program has been written as an arcade game! The player becomes involved in playing the game and forgets that he/she is supposed to be learning! The student must enter the answer to a math question that is shown in the body of a flying saucer moving down from the top of the screen. There are four saucers moving down from the top toward the player. The player must maneuver his base under the saucer, enter the answer to the problem, press the spacebar to fire the laser. A new saucer with a new problem replaces the one just blasted. The score, time in play, number of hits, number of misses, and number of bases left to the player are displayed at the top of the screen. All of this is in high resolution graphics using the new 4 color mode on a black screen! There are four levels of difficulty, and you may select either addition or multiplication. Don't bore your kids with smiling clowns or happy faces! They want to play arcade games — let them play GALACTIC MATH and learn at the same time!
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We put our popular IAGO game (similar to Othello) in MODEM form. Now you can play it over the phone! Make your move, the pieces are flipped for you, select a message, press a button, and seconds later your opponents board is updated with your move. If you decide *not to send* the move you made, press a key and take it back. Super game!
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16K or 32K Extended Basic Required
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Disk bombed again? Can't really afford those expensive programs that might fix your disk? Anyone can afford the price of this program. COLOR DISK SAVER will save your sanity, as well as your disk. Don't wait until it is too late! COLOR DISK SAVER will save your disk to tape, reload the tape to disk if you ever need to restore the disk. Also has a tape verify command! Don't delay!
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DD CLOCK

A *Real Time* clock that shows hours, minutes and seconds. You can type in and run your programs just as you normally would, while DD CLOCK is ticking away in the top right corner of your screen. And just in case you forget to check up on the time, DD CLOCK will sound a tone every hour. This program does not interfere with programming! You will notice no difference when running your programs. Many machine language programs are also compatible with DD CLOCK. This program uses one of the most powerful features of your 6809 microprocessor!
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AUTOLOAD will load any tape program or file and put it on disk for you automatically! Autoload will skip programs with errors and go on to the next program, either automatically or it will stop and wait for you to tell it to go on. Autoload will also fix all of those machine language programs that load either down in the disk system area or lower. You will no longer have to remove the disk countroller before playing a game. Autoload will do all of the hard work for you, while you watch! All machine code program. **Will not load copy protected programs.**
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VISA

DDH Directory-File Builder An Enhancement For *Disk Data Handler*

There are so many ways to produce a disk directory that all of them would not fit in a 64K machine — they all seem to revolve around *DSKI$*.

DDH Directory-File Builder is no different in that respect. The difference is that this routine uses the power of your database program to do what it does best, manipulate data.

The trick is to read your disk directory and write it to a file in the format that can be read by your database. The objective is to minimize processing time. There was a nice BASIC program published in *80 Micro* which would read each disk and collect the data into a master directory, a complete library list. I patched *Qsortbin* from the June issue of *Rainbow* so the program would have a M/L sort routine. Even with this patch and three second sorting time, execution for each disk approached four minutes when dealing with three or four hundred records. I have *a lot* of data files.

The beauty of having a master library is to be assured that you have properly backed up those important disks with *all* the programs included.

The heart of the program is writing the data in the appropriate format which can be read as a standard file. In the case of *Disk Data Handler*, all records are handled as strings, making the conversion relatively easy.

Program execution is simple and fast. As quickly as the drive can read a directory, you are prompted to insert another disk or END. This routine can continue until you have about 500 program titles in the buffer of a 32K machine. You must then save this data to a file.

If you have more than 500 titles, you can resume with another session. Upon completion of reading directories, you must run *DDH* and load the directory files. Using the typical directory information, i.e., name, extension, type, format, and size, plus a disk label of 10 characters, *DDH* will process over 1500 records with the 64K version.

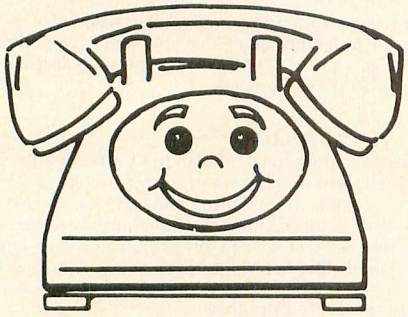
Sort time for 550 records was 15 seconds. I chose to add a 40 character "comment" field to each record which reduced the capacity of *DDH* to 500 records.

The best feature of *DDH Directory-File Builder* is that it provides an accurate, no hassle software inventory quickly. A hard copy listing can be customized to your needs through the reporting feature of *DDH*.

The directory program listing (it's very short) is being included with the *DDH* package at no extra charge. If you would like a copy of the listing, send a S.A.S.E. to Custom Software Engineering.

(Custom Software Engineering, 807 Minuteman Causeway D-2, Cocoa Beach, FL 32931)

—Ed Sehlhorst



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VC Wargame Called Good Simulation

"You've been in 'Nam 90 days now but sometimes it feels like forever. No matter how well the Viet Cong are thrashed one day, it seems they're back in even stronger numbers the next." If this sounds like a very unpleasant scenario, it is, if you are in it. To warmongers, it's a boon.

VC is a new simulation for the Color Computer, that is different from all others. You are in charge of the Huy Bihn Province with 10 ARVN (Army of the Republic of South Viet Nam) units. Your mission is to eradicate VC activity in your area.

After watching a good title page you have the choice between six levels of play. Zero is very easy, while level five is nearly impossible. The board then sets up your units in a small bunch at the bottom of the screen. Small yellow pyramids are put all over the screen with small gaps. These represent neutral civilians. A neutral civilian could be one of three things, a VC unit, a North Vietnamese Army unit, or just a neutral civilian. How do you find out which one of the above they are, the hard way, of course. You move one of your units next to or on top of it, Vietnamese unit can positively identify it. The Air Cav can't tell if it's an enemy unit, unless it attacks you. To identify a civilian move a ARVN next to or on top of it and if it is friendly it will sometimes turn blue, if it is a VC it will turn into a red soldier and attack you, a NVA does the same except that it is blue and red.

NVA units are bad news. Fortunately, they appear only on the higher levels. The artillery you can use to hammer away a enemy units, but if you don't destroy them on the first shot, you'll almost never get them. The VC turn neutral civilians into VC by sitting next to them for an unknown period of time or if possible will kill friendly civilians, which gives away their position for artillery. The Air Cav can only move into an unoccupied space, and artillery can't move. I found, by accident, that you never shell friendly units, word gets around and the friendly units all turn neutral!

The object of this madness is to destroy all enemy units, without having more than half of the civilians become VC of killed, after all how can you save a country if you destroy it?

As a wargame player, veteran of many battles in space, air, land and sea, I would rate the game high for a computer simulation. The documentation was a bit confusing since the Apple, TRS-80, Atari, and IBM instructions are mixed in, but not beyond comprehension. It is very nicely packaged in a box case with a picture and a description on the back. It includes the Atari and Model I-III versions as well as the Color Computer version. It runs in 16K tape and works without a hitch with a disk drive. You can use the keyboard or joystick to control movement.

(Avalon Hill Game Co., 4517 Hartford Road, Baltimore, MD 21214, tape $20)

—Jeff White

FILMASTR

The Color Computer has a powerful ally in FILMASTR. This is a DATA MANAGEMENT SYSTEM that you can trust. FILMASTR combines the best features of the big systems to provide a combination of speed, power, and ease of operation that can't be beat.

YOU are in complete control of this friendly program with no programming knowledge required. You design the data screen with up to 20 fields by moving the cursor on screen with the arrow keys and typing in the field names. FILMASTR takes care of all of the rest.

Enter data by just filling in the blanks. This form fill-in is easy and natural to use. You can even copy data from the previous record with one key-stroke. Add records, delete records, change records without fuss.

Tell FILMASTR to sort your file on any field that you want or to retrieve a particular record and the job is done with super-human machine language speed. FILMASTR will find a single record or a group of records that meet your request and will save those records as a separate file if you want to.

Controlled printing formats? Of course! Tell FILMASTR which records to use, which fields to print and in what order. You can control the print location to any position on the page. Mailing labels? You bet!

All commands are given to FILMASTR with single key strokes. Press the HELP key (BREAK), and the available commands are displayed. Make your choice from the menu and let FILMASTR do the work.

FILMASTR can store up to 255 characters in each record and up to 24,000 characters in each file. (9000 with 16K).

FILMASTR **16K or 32K EXT BASIC** ..... **TAPE $29.95** **DISK $34.95** **AMDISK $39.95**

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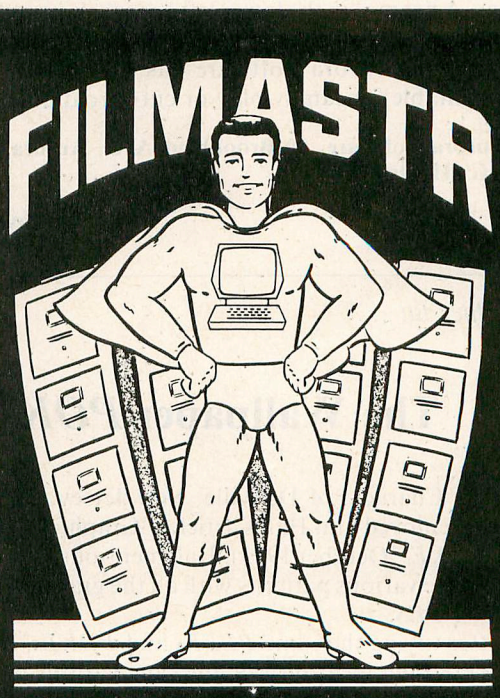

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Battle: A Little Game That Grows On You

As a wargamer of some 20 years experience, I tend to think of the simpler games as rather trivial, so when I *CLOADMed* Aurora Software's *Battle*, the thought "just another battleship" came to mind. Well, not quite!

Battle is a two player game (with reasonable solo play capability) in which the two players take turns searching on the same low-res map for enemy ships. This has the unexpected effect of placing the two players in roughly the positions of allied destroyer captains searching for members of a hidden U-boat wolfpack. Each wants to make the kill, but the best chance for success is through cooperation with the other ship commander so that both may work at full effectiveness. If the players only compete against each other there will be a winner, but the winner will have a lower score than if the players had worked together to set out a formalized search pattern.

In addition to 12 hidden boats, there are 12 "bombs" (I think of them as mines) concealed in the map grid. A player is out of the game after hitting three "bombs." These and other details are listed on a short, but adequate instruction sheet.

At game start, players enter their names, which are displayed on the screen along with a running total of the scores. Also on the screen are the 10 x 20 zone map, a listing of the number of boats left unsunk (the 12 boats range from two to five units in length), and a score of "BOMBS HIT" by each player. A prompt in the lower left corner shows whose turn it is.

All in all, Aurora Software has produced a neat little game suitable for family play or cut-throat competition.

(Aurora Software, 49 Brookland Ave., Aurora, Ontario L4G 2H6, tape $20)

—Nevin Templin

Graphics Bit . . .

The Wallpaper *POKE*

Mark Charney, of Denville, New Jersey, writes, "I thoroughly enjoyed Jim Hall's article ("Graphics Special—The '178' *POKE,*" October 1983). Hall mentions that he was able to produce various patterns with all the graphics commands except *PCLS*.

"After toying the some *PEEKs* and *POKEs,* I discovered that *POKEing* location 179 gives me various backgrounds when *PCLS* is used."

Here's a little Demo:

```
10 PMODE 3,1
12 SCREEN 1,1
14 POKE 179, RND(255)
16 PCLS
18 IF INKEY$="" THEN 18 ELSE 14
```


When In Rome Count *Roman Numerals*

That's also a good idea in most American elementary schools, where learning the Roman system is a traditional task. Whether you want to write outlines for English papers or simply figure out copyright dates for movies, Moreton Bay Software has a program, *Arabic Numbers: Roman Numerals,* that will help youngsters (or remedial adults) learn the conversions.

The program is straightforward: Two tutorials teach the conversions and a third tests the students on their mastery. The tutorials present the numbers and numerals in sequence to help understand the significance of the Roman symbols M, D, C, L, X, V, and I. Teaching *in sequence*, I believe, is a minor flaw in the program, since it permits students to guess ahead and thus avoid the necessary monotony of memorizing the code. The program unnecessarily increases monotony by sending students back to the beginning every time they make an error in the initial learning phases; thus it does *not* always reward them for items they previously mastered.

Once the basic conversion has been learned, the students are tested and the program provides bells and whistles for right answers and a raspberry for the wrong ones. It also keeps score and gives praise in the form of number puns: "GOOD 4 YOU." The program will supply correct answers to missed questions, but it curiously flips to its "RIGHT" mode after giving the answer, possibly giving students the mistaken impression they answered the item correctly.

The programmer missed a good bet, I believe, in not drawing on the potential of the CoCo (or any computer) to allow a student to break Roman numerals into their constituent parts on the screen and then figure out the numerical significance of the clusters. For example, instead of simply supplying a numeral:

MCMLXXXIV

and asking the students to decode it, the program could have reinforced skills by letting the student break it down on the screen something like this:

```
          M= 1000
CM=1000-100=  900
LXXX=50+30=    80
      IV=5-1=   4
MCMLXXXIV= 1984
```

Nevertheless, *Arabic Numbers: Roman Numerals* "works," teaching the conversions efficiently and accurately. The only complaints I heard from students were that the program was a little dull. It was agreed, however, that the program was a lot better than learning the same material in an arithmetic textbook.

The instructional manual is clear and helpful, and it contains some excellent supplementary information on the origins of Egyptian, Roman, and Arabic number systems.

(Moreton Bay Software, 316 Castillo Street, Santa Barbara, CA 93101, cassette, 16K, $XVI.XCV)

—Stephen N. Tchudi

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"Blackjaq is an excellent program which sshould be bought by all players who plan to go to a casino or who wish to know how we counters work our game"

Rainbow, Nov. 1983

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The Official BASIC09 Tour Guide

By Dale L. Puckett

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Hardware Review

Getting Even With The Byte Bat

I was keying in the seventh page of an eight-page Adventure game, hours upon hours had passed — just one more page and I could play that long awaited game — when it happened. The telephone rang, I answered it, turned to glance at my CoCo and the screen was snowy. Beau, our overzealous retriever, had gone behind the table to "retrieve" his play duck and disconnected the computer. I hung up the phone and Beau fled in terror, knowing the fury that was about to ensue. I ran to my secret hiding place, grabbed the bat, dashed to the CoCo and beat the keyboard and monitor with it, screaming every expletive known to mankind — I even made some up.

Yes, my chips were down but they weren't destroyed because they were the victim of my Byte Bat, a 17-inch soft, foam rubber "aggression/frustraton" bat, by MicroTie Systems Corp. This light blue "anger reducing device" is an accessory no computer user should be without.

The Byte Bat comes with a witty user's guide, an 11 x 17-inch "Strike Back" wall poster, a decal which says "Warning, this computer friendly liveware is protected by Byte Bat," and a button.

There are three recommended "digital interfaces," or ways to grip the Byte Bat. The first is the Bi-Bit Grip, which should be used when you feel only a little stress and frustration. Using the thumb and index finger, firmly grip the bat and smash away. Care must be taken when using this interface because of its two-finger flimsy grip — the bat may fly out of the aggressor's hands and into an innocent co-worker's (or family member's) face.

During those days of high level frustration, using the Binary Grip is most comforting. This grip uses the thumb and four fingers — like the customary tennis grip. It's kind of like clenching your fist. Get the picture?

Thirdly, and deadliest of all, is the Byte Grip, using the thumb and *seven* fingers from one hand. This interface is recommended only in extreme cases, such as system failure or job failure (when you are thinking of ways to kill your boss . . . or retriever).

The Byte Bat is used and measured in "B.A.U.D." Rates (Basic Aggressive Units of Dissatisfaction) which range from one to 12,876,453. There is a warning for B.A.U.D. rates in excess of 100 — it may be hazardous to the aggressor's wrist, arm and psyche. My B.A.U.D. rate has been measured at 12,000. Care to top that?

The user's guide also includes hardware and software applications. For example, "Use of the Byte Bat is recommended when: You set up the printer to print the listing for your new program overnight, and return to find that all 25,000 lines have printed on top of each other due to a paper jam." Or my favorite, "When your speech synthesizer begins to stutter or speak only Portuguese."

But what about the little darlings at home to destroy your computer work? Well, "liveware applications" are also included in the user's guide. "Use of the Byte Bat is recommended when: Your three-year-old washes all your discs for you, as a special treat." And, yes, it is recommended for all computer widows and widowers.

As you might have guessed, the Byte Bat is excellent for office use. It has been a favorite frustration device here at *the Rainbow*. When it arrived, the editorial and art departments gathered around for the unveiling. Everyone got their turn at bat, too. Now it is only used in serious applications — like deadline week, or a partial crashing of a *Rainbow On Tape*.

I recommend the Byte Bat for all computer users. It can be used for the office or at home, although the carton warns that it should be kept away from children under the age of three, since pieces of the foam rubber may be bitten off and swallowed. The Byte Bat is fun, and most importantly, serves its purpose — as a safe, frustration relieving way to beat up your CoCo, or any other person or animal who stands in your way of computing. Who says man's best friend is a dog?

(MicroTie Systems Corp., P.O. Box 8112, Walnut Creek, CA 94546, $12.50)

—Susan Remini

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Hints . . .

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— Ed Ellers

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VDOS works with all Color Computers—from 16K non-extended to 64K extended. Obviously, the more memory you have, the greater number (and length) of programs you can store. For a 64K system, VDOS also uses the "unused" part of memory, providing up to 50,000 bytes of storage! Now, that's some disk!

We call it VDOS because in the future there will be utilities for your VDOS UNDISK that will give even greater capabilities—such as a full one-pass memory dump to cassette. Other utilities are planned, too.

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Teee Offf: A Challenging Round Of Micro-Golf

Teee Offf is a golf game for a 16K Extended BASIC CoCo or TDP-100. The game comes on a cassette with a two-page instruction sheet. *Teee Offf* can be played by one to four players, each player taking his turn at each hole in rotation. Unlike the real game of golf, each player is required to complete each hole before the next one can start. However, all players must complete a hole before any of them can continue to the next. The game is played with the right joystick, as are most single joystick games.

The game consists of nine holes of golf. Each hole is comprised of a series of sand traps, water traps and cactus in place of trees. I guess the writer lives in the southwest where there is an abundance of cactus. If a player wanders into either the sand traps or the water traps, he is required to play his way out. In the real game, that is true for the sand trap. However, when a shot is placed in the water, the player is required to drop another ball no closer to the hole than where he entered the water and take a penalty stroke. This version allows the player to *play his way out of the water*. Of course, each stroke must be quite firm and strong or the ball will hardly move at all. This could make it very unwise to take a shortcut across the water trap.

The ball is hit by placing the golfer and club such that the tip of the club is just touching the ball. The angle between the club and the ball will determine its direction. The golfer will always wind up in a counterclockwise direction. Once the golfer is positioned, holding down the firing button will start his windup. The longer the fire button is held down, the larger his windup will be and the further the ball will travel. That is, unless an obstacle is encountered. Thus, the distance the ball is to travel is dependent on the amount of windup and any obstacles in its path.

Once the ball has been hit to the green, the screen will change and present an enlarged green. The method used here is the same as on the fairway, except now the ball will travel further with a lighter stroke—the characteristics of a true green.

The entire procedure is repeated for each of the remaining holes. Once all nine holes are finished, the round is complete and the game can be restarted for, say, the back nine.

The game is loaded from cassette using the *CLOADM* "TEEEOFFF" command. Once in, the program is started using the *EXEC* command. The game presents a grid with a square in the middle of it. Instructions are presented indicating that if the color of the square is not blue, press the reset button until it is. Once completed, you are ready to start the game. You will be asked for the number of players which will be playing. In all cases but one, I only used the one-player option. As you progress around the course, you will be presented with various par holes, which perform doglegs to the right and left.

In playing the game, I found the graphics to be of good quality. The course was well laid out with the usual amount of hazards presented. The motion of the ball is smooth and the club swing consistent. The player is sort of a stickman who on some occasions has the nasty habit of being split between the right and left part of the screen. If you are playing near the borders, that part of the player extending beyond the boundary of the screen appears on the other side.

I did get into some positions from which I found it impossible to hit the ball in the manner I wanted to. In one case, on the fifth hole, I found myself about one inch from a cactus. Each time I tried to hit the ball toward the cactus, or even near the cactus, the ball would not move, but I did receive a stroke. At first, I thought I was not properly positioned on the ball, but then I noticed that the stroke count was going up. I was forced to play a shot parallel to the cactus in order to move the ball. Once it was above the area of the cactus, I could play the shot I had wanted to.

When the ball hits the out of bounds marker, it has a tendency to slide along the out of bounds marker like it was a wall. I found it takes quite a bit of practice to get the player positioned where you want him. In some cases, the response to the joystick movement seemed quite sensitive and, in other cases, it was almost nonexistent. I found that the fine adjustment took quite a bit of practice and patience.

All in all, I found the game to be amusing and fun to play, as long as the player could live with the positioning difficulties. I enjoyed the game and actually found myself getting a birdy on seven, the second time around. The graphics are good and the player action is smooth. The ball travel is smooth and consistent from round to round.

The game is fun and challenging. It represents its real challenge in the form of par, as it should. It is not easy to get par on some of the holes, and I believe that is the way it should be. I did find that a return to center joystick would help considerably, but that is due to the way Radio Shack joysticks are built and not a fault with the game. The game is fun to play and does provide a fairly good challenge to break par.

(Prickly-Pear Software, 9234 E. 30th Street, Tucson, AZ 85710, $24.95 on tape, $29.95 on disk)

—Frank J. Esser

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Color Tutor — A Meat And Potatoes Utility

Many people who are contemplating purchasing a computer often ask the question, "What do you do with your computer?" I can think of a number of reasons for owning a computer, but they usually don't impress the person asking the question. Learning programming or playing games just doesn't cut the mustard in the minds of those who see the computer more as a tool than a hobby. Even balancing the family checkbook doesn't go over since most will argue that they can do it faster with a calculator. However, those of you with school-age children have a ready made justification —education. By education I don't mean learning BASIC —not everyone has to be a programmer. But, as everyone knows, the computer is a very useful tool for presenting material to youngsters that they must learn by rote such as state capitals, vocabulary drills, foreign language, math problems, etc. *Color Tutor* by Elite Software is such a tool to assist in this endeavor.

Color Tutor is the kind of program that everyone says they will write for Johnny or Suzie when they first buy their computer. But let's face it, not many of us do it. The program comes on tape, but a disk version is also available. It can be used with a 16K machine but requires Extended BASIC. After loading the program and typing *RUN* (the program comes on a non-protected tape and can be saved to tape or disk and since it is written in BASIC it can be modified), the following menu appears:

(1) TYPE NEW LESSON
(2) LOAD LESSON FROM TAPE
(3) EDIT LESSON MATERIAL
(4) SAVE A LESSON TO TAPE
(5) STUDY LESSON
(6) EXIT PROGRAM

While all of the items in the menu are self-explanatory, several comments are in order.

To prepare a new set of questions and answers, one selects item 1 from the menu. *Color Tutor* then requests the number of questions to be entered and then prompts you for each question/answer pair. A maximum of 50 questions may be entered, however in a 16K machine it is suggested that the question length be limited to 32 characters, but with a 32K machine the question length is 64 characters. For most drill type questions this is not a severe limitation.

Option 3 is provided to permit editing of a lesson. Now this is not a word processor type editor. *Color Tutor* simply asks for the number of the questions or the answer or both. Since the type of questions and answers which you might use with *Color Tutor* will usually be short, this type of editing is not a disadvantage. One interesting aspect of the editor is that it is password protected. The purpose of the password is to prevent the student from accessing the questions and answers through the editor and thus alter them. While it is interesting that Elite took the time to add this option, it is

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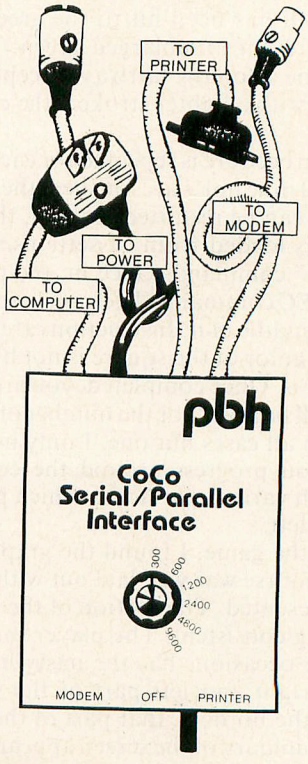

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disappointing the way they handled it. The user does not have the option of choosing his own password which could be saved with each lesson — a simple item to program. Rather, the password is specified in the program and can't be changed by the user unless he does some reprogramming. This is an item that I feel Elite could improve upon.

Option 5 is chosen when a lesson is to be studied. Upon choosing this option, *Color Tutor* will randomize the questions and then present two options for choosing the correct answer. With the first option, the answer must match the correct answer with the exact spelling. The other choice checks the spelling of the answer with only the first three characters of the correct answer. Each question is then presented and a score of the correct vs. wrong answers is kept. At the end of the lesson the student is presented with the option to repeat the lesson.

Color Tutor performed exactly as described in the brief but adequate directions. To check out the program I chose to enter 50 questions — the limit of the program. For my questions I chose the state capitals. After entering the questions, I first saved the lesson to tape. It prompts the user for the file name and then immediately starts the recorder, ie. *Color Tutor* does not prompt you to set the recorder to record mode. Fortunately, I anticipated this possibility and had the recorder ready. This "glitch" should obviously be corrected as it is bound to cause some inconveniences for most people. Almost every program which I have purchased provides a prompt to ready the recorder. I would hope that Elite would take care of this problem. But, once loaded, the lesson ran as expected — of course, I didn't know all the state capitals and I won't mention my score either.

Color Tutor is a meat and potatoes program. It does what it is supposed to do, which is better than a lot I've seen. In other words, no bells and whistles or blinking lights or musical renditions — some might argue that this is a disadvantage since reinforcement for a correct answer makes learning more fun. But, the important thing is that it is a nice little educational utility program to have around when there is the need to review school assignments.

The major limitation to *Color Tutor* is in the method of answer checking. Either the answer must be spelled correctly or the first three letters are checked. This is okay for single word answers but obviously a problem for the more complex answer. For those who feel that this is a severe limitation, I would suggest the more sophisticated CAI type programs such as Radio Shack's *Color PILOT,* which is also considerably more expensive. However, I think most will agree, *Color Tutor* is very useful in the home when there is the need to study material such as mentioned above. I definitely recommend *Color Tutor,* but I personally feel that it is slightly overpriced.

(Elite Software, P.O. Box 11224, Pittsburgh, PA 15238, tape $19.95, disk $22.95)

—Donald D. Dollberg

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Mansion Of Doom— A Fun, High Quality Adventure

Webster's dictionary definition for 'adventure' is "an enterprise or performance involving the uncertain or unknown." However, I do not think that he had a computer Adventure in mind when he wrote that.

Mansion of Doom, by Pal Creations, is a high quality Adventure game made for the 32K Extended BASIC Color Computer. It comes on an easy to load five-minute tape with a single copy saved on each side. The instructions say to unplug your disk interface, if you have one, before loading the program, which would then make it very inconvenient to use for people with disk drives. However, I have discovered that a simple *PCLEAR* will allow you to run and save the program to disk with the disk interface plugged in.

The program takes exactly two minutes to load from cassette, and about eight seconds for a disk. It is written in 100 percent BASIC and is almost 18K long. There are no graphics in the program, but that is more than made up by the 76 rooms, 65 objects, 11 user verbs and six different directions (U,D,N,S,E,W,). The instructions, although only half of a single side of a piece of paper, are sufficient. There are instructions in the program also. It seems that the program could have been put on a 16K computer if they had left out the instructions and stripped and compacted the program with some sort of compresser program. As to why they didn't, I really don't know. It would have allowed a wider range of people to purchase the program.

You have been chosen to rescue Princess Marlena who has been kidnapped by the evil Count Von Steinhoff. To do that, you must enter his mansion on the edge of town and try to find her, hopefully alive! Others have gone inside the mansion, but not one of them has ever left!

Once you enter the mansion you are met by vampires, bats, werewolves, and other creepy creatures. You can, as previously mentioned, travel in six directions, which is in my opinion, a welcome plus. However, there are only 11 verbs, which is rather inconvenient. For example, I like to use the word TAKE when I would like to acquire something. But the program only recognizes GET, and I was continuously bombarded with a screen of all the available commands (another plus) when I forgot to use GET instead of TAKE. Also, there is no way to save your position to tape, so you can quit and continue the game where you left off later on. It shouldn't be a problem for the more advanced adventurist, who should be able to solve the adventure in about four to five hours, but if you aren't that good, be prepared to spend the night.

I could only find one bug in the program. When you get chained in the shackles, the only way to get out is to type "YORL." I couldn't find any other ones, although when you get to some certain places, you might think you are in an endless loop. You actually aren't, and it is not a bug in the program. Just be patient and you should eventually get out.

In conclusion, I think it is a fine program for most people. I would not recommend this for beginning or extremely advanced adventurists. Its level of play is most suitable for someone in-between. The price of $14.95 is, in my opinion, rather high for a non-graphic Adventure game, but it is a very good program, and should give you hours of fun.

(Pal Creations, 10456 Amantha Ave., San Diego, CA 92126, tape $14.95)

—Paul Gani

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Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the program works. We're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, *the RAINBOW*, P.O. Box 209, Prospect, KY 40059. We will send you some more comprehensive guidelines.

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Textpro III features a whole host of Document Formatting commands. The setup command section includes: Line Length, Top, Left, and Bottom Margins, Page Length, Page Numbering on/off and Automatic Word Fill and Justification on/off.

Some of the vertical control features include: test for number of lines left on the page, skip to next page, set page number, wait at top of page, single and multi line spacing, and skip blank lines.

Textpro III features 3 programmable header lines that can be centered, left or right justified. It also has one programmable footer line. 3 commands for continues, single and paragraph indenting, center text, underline and double width print commands.

Footnotes and Special Commands

Some of the special features allow imbedded control codes to access intelligent printer features like; superscript, subscript, change type font and even graphics. You can even imbed control codes within justified text. There is a command that automatically places footnotes at the bottom of the page, which can be very handy for term papers, etc. Another command allows you to display a message on the screen and input text from the keyboard. This text is then printed as if it has been part of the original text, thus you can produce things like a personalized form letter. There is also a repeat command that allows you to repeat an entire document or a part of one as many times as needed up to 255 times. This can be used to produce mailing labels or combined with the previous command to produce a selected number of personalized form letters.

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Textpro III features an elaborate system of tab commands for complete control over column formatting. There are 10 programmable tab stops that can be defined or re-defined at any time in the text file. They can be used with the following tab commands; Center Over Tab Column, Right Justify to Tab Column, Decimal Align Over Tab Column, Left Justify to Tab Column (Normal Tab) and Horizontal Tab. Tab functions may also be used with a numeric tab column position for maximum flexibility. You can also define the Tab Fill Character to any printable character to fill in the blanks with dots, dashes, etc.

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The Mini Modem And *Colorcom/E*: An Easy Way To Get Connected

by Ed Ellers

Greta Garbo once said "I want to be alone," but a lot of computerists would disagree when it comes to their systems. Many people are interested in getting their computers hooked up to the outside world of bulletin boards, information services and computer-to-computer communication over telephone lines. With the "Information Age" in full swing, one could argue that having a computer without a modem is almost like not having a telephone in your home.

Mura's MM-100 Manual Mini Modem is a low-cost alternative for those who want to jump into data communication without much of an outlay. For under $80 you get a unit that does everything a modem has to do. The MM-100 will make the connection between your computer (not just the CoCo, MC-10 and Dragon, but almost any personal computer) and the phone line; the catch is that you must switch it on and off manually. The Mini Modem does not hang up at the end of a call, answer incoming calls automatically or dial numbers. Even so, the Mini Modem is very easy to use; it's simpler in some ways than more sophisticated modems. (The Mura is very similar to the Radio Shack/TDP Modem I; its operation is almost identical to the Modem I, but the Mini Modem's circuitry is much less complex.)

The Mura unit is a direct-connect modem, which means that it plugs directly into your telephone line jack (as opposed to acoustic couplers, which have a cradle in which you place the handset of your phone). It is, of course, FCC registered and legal to use on phone lines in the United States. One note here is that in some states local telephone companies are allowed to charge an extra monthly fee, which ranges from fifty cents (in Vermont) to $49.50 (in Oklahoma), for the privilege of using their lines for data communications, or in some cases for using another device on the line. In a few states, you must have business service (at its higher rates) on the dubious grounds that if you are transmitting data you are "using the telephone for business purposes." Before buying a modem, check with the telephone company in your area about the tariffs governing modem use; if they don't tell you what you want to know, try your state's regulatory agency.

The instruction book does correctly tell you to notify the phone company when you connect the modem, but this is only a legal requirement since the Mini Modem does not place an additional load on the line and does not affect the operation of the phone company's equipment or (when it's switched off) your phone service. To get it going, you just unplug the phone nearest to the computer, plug the modem's cord into the phone line jack, plug your phone into the Mini Modem's jack and then connect the modem to the computer's SERIAL I/O jack. (Spectrum Projects sells the modem with a cable to connect to the CoCo.)

With the Mini Modem, a telephone (and of course the Color Computer), the only other thing you need is some kind of terminal program. The standard in the field, Radio Shack's Videotex cartridge (and formerly cassette), was designed strictly to communicate with information systems; you can't "download" a file (such as a program), save information to cassette or disk or print out what you receive. Along with the modem, I received a copy of Eigen Systems'

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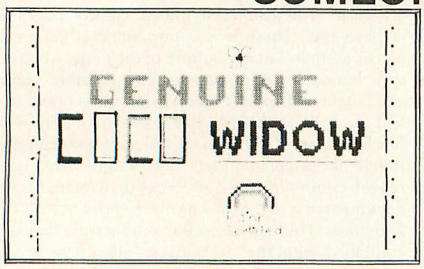

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Disk Colorcom/E Version 2, which is primarily what I used to test the Mini Modem.

With *Colorcom/E* Version 2, you can:

- Download a file (such as a BASIC program or a newsletter) from the computer on the other end (known as the "host").
- Upload a file from your CoCo to the host system.
- Print out a copy of any or all of your communications, or save them to disk.
- Do "auto log-on," which means that *Colorcom-E* automatically types in your name, account number, password or whatever you would normally have to type when getting on a system.
- Read the incoming messages on a 51-column, 24-line screen with both upper and lowercase letters.
- Display weather radar maps, financial index charts and game graphics from CompuServe and some other systems.

Colorcom/E Version 1 was reviewed in *the Rainbow* in November 1982. Version 2 has added the 51 x 24 upper/lowercase display mode (much like that of Telewriter); it's a big help because most of the systems that you will be "dialing up" use a greater line width than the 32-character text screen built into the CoCo.

Disk Colorcom/E "V2" (as Eigen Systems calls it) has a menu that lets you select auto-logon sequences for several services. You can edit the files for the various procedures, and then set up the menu to select them. To log on to a particular service, you first press a number key for the service you want. When the file has loaded, the screen will show the phone number for that service (which you put in earlier). After you make the connection, *Disk Colorcom/E* will type in the account number, password or whatever needs to be typed. That's it! (I'm told that a cartridge version of *Colorcom/E* V2 is almost ready to be released; if you intend to buy the cartridge, ask about the availability of Version 2.)

The Mini Modem, like most modems, has two modes called "originate" and "answer." In general, you use "originate" when you make a call and "answer" when someone calls you. To call a bulletin board or some other service, you pick up the phone and dial the number and wait for the computer to answer. When you hear the high-pitched "answer tone," switch the modem to ORIGINATE and hang up the phone. If somebody calls you (say to transfer files), you pick up the phone and switch the modem to ANSWER; when the green CARRIER DETECT light comes on you hang up the phone. In either case, after you disconnect from the other system and the CARRIER light goes out, you would switch the modem off to hang up. (If you forget to turn it off, your line will remain busy.)

Using *Disk Colorcom/E* Version 2,I logged on to all the local bulletin boards at numerous times (driving one of the sysops to the point of distraction) as well as two out-of-town BBSes and CompuServe and The Source, using local and AT&T and GTE Sprint long-distance connections. In every case, the Mini Modem performed flawlessly, without a single character garbled as far as I could tell.

If you want to get on-line without emptying your wallet to do so, the Mura Mini Modem and *Disk Colorcom/E* together are one of the best ways to do it.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, N.Y. 11421, $79.95 + $3 S/H, $49.95 with purchase of *Colorcom/E; Colorcom/E* $49.95 (cartridge or disk); cable for CoCo $14.95 with *Colorcom-E* purchase)

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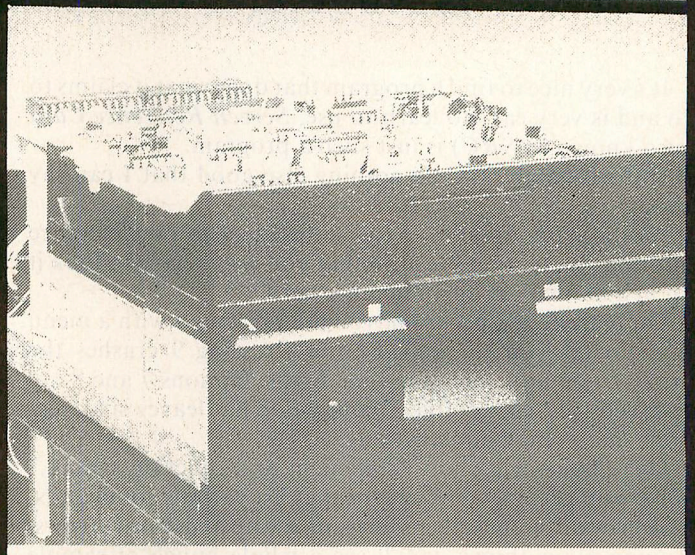

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Screen Reference Card Is No Ace!

It's very nice to find a program that does what it claims to do and is very easy to learn to use. *Screen Reference Card* (also known as *SRC*) is just such a program.

Unfortunately, there's nothing else good that I can say about it.

As the name implies, *SRC* is designed to put reference information on the screen so that you won't have to look it up in a manual or on a reference card.

On loading the program, you are presented with a menu that invites you to press 1 to 9. Pressing 9 crashes the program on an Undefined Line Error. Options 7 and 8 are reserved for "user defined" routines. That leaves six selections that actually do anything.

One choice will show "statement and function syntax." What you get is several screens that list various commands. You view different screens by using the up and down arrows. Among other things, you'll see a whole bunch of sample format strings under "print using"—without the slightest indication of the formats that any of them will produce.

"Operators and special characters" are listed in an utterly illogical order. The first line of this section tells you what the plus and minus signs do, in case you didn't know, and the third shows the asterisk and slash for multiplication and division. Doesn't *SRC's* author know the priorities of operators?

If you select "X/Y coordinates," about all you'll really learn is that, on a graphics screen, there are 256 locations across and 192 down.

"Text screen locations" is a screen that, if read in conjunction with the instruction sheet, will show you where the *PRINT* @ locations are.

"Graphic character codes" and "ASCII character codes" are self-explanatory.

On the "user-defined" options, the instruction sheet suggests that you might want to use one of them to write a routine that will display a list of *POKE* locations. No samples are offered.

Think about it. In order to write such a routine, first you'd have to make a list of the items to be included. And once you have researched and compiled the list, what in the world do you need the program for?

The whole premise of *SRC* is, in my opinion, flawed. The author thinks it would be faster and easier to use his program for looking up syntax and other information than to use a reference card.

Trouble is, the time when I need to know where the commas go in a *CSAVEM* statement, or what's the code for a red checkerboard pattern, is the time when a program that I'm working on is in the computer. It seems a waste of effort to save the program in progress just so I can load *SRC* to look up the answer.

For much less than the price of this program, you can get the Nanos reference card, which is much easier to use and far more informative. For command syntax, the red card that came with the CoCo is usually all you need (in spite of a few typos).

(CoCoData Enterprises, 1316 Quail Ave., McAllen, TX 78054, 16K ECB cassette, $7.95)

—Neil Edward Parks

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The Great Hamster Hunt — It's Even Fun For Fathers

Oh well, another Adventure game. Time to type in all those directions to find out where the hamster is hiding. But wait, what's this? Graphics, sound, and some real adventure. Maybe I'll take a look at this program.

The Great Hamster Hunt is not your everyday Adventure game. Most games of this type have provided the user the ability to move from room to room using one word commands. *The Great Hamster Hunt* expanded this concept into an enjoyable game for children, especially between the ages of three and 10.

After the game is loaded and run, a map of the house is shown. Each of the rooms is represented by an object that would be found in that room. The picture of a bed means bedroom, a stove is the kitchen, etc. The program user is represented by a yellow and red square which appears on the map. The square is moved from room to room on the map using the arrow keys. Once the user is in the selected room, the spacebar is pressed to enter the designated room. The room is drawn on the screen and objects that might be in a room of this type are drawn in high resolution graphics. To move around the room, the user presses the arrow keys until the yellow and red box is on one of the objects. The space bar is then pressed to search that object for the hamster. The search is continued until it is sure that the hamster is not in that room. An M is pressed to return to the map and choose another room. When you are in a room and hear some spooky music it means that the cat is about to enter the room. When the cat slinks into the room it is time for your exit. Sometimes the hamster is seen scooting out of the room, sometimes it is not seen. The hamster may change rooms but it still might be hiding in the room. It may be searched again later in the game.

When the happy music is heard, you have found the hamster. The hamster is put in his cage. A well drawn picture of the hamster is displayed and some lullaby music is played to lull the hamster to sleep after it's long ordeal. The game may be played again or stopped at this point.

My first reaction to the game was not extremely positive. My five-year-old son took control of the game and had a great time playing it. He was excited and even learned something in the meantime. He was moving the cursor from my verbal directions. Right, left, up, down. After the directions were explained, little difficulty was encountered in understanding the game. Well, needless to say, my initial reaction was wrong. *The Great Hamster Hunt* is a great deal of fun. Even for fathers!

(Computer Island, 227 Hampton Green, Staten Island, NY 10312, 32K ECB tape, $19.95)

—Rick Cobello

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Dugger's Growing Systems has the cost effective C for OS-9. It contains all the necessary C commands (while, if, if else, int., char, etc.) which may be linked, loaded, and used in a multi-user, multi-tasking environment.

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The Premium: Micronix's Finger-Walking Keyboard

The Color Computer keyboard has been the subject of a great deal of criticism since it has been available. Many people hate the Chiclet-like keys and snap action, although some users do like it. When Radio Shack introduced its new 64K CoCo, it included a new keyboard with larger keys, but the new keyboard is just as controversial as the old with some people (myself included) saying that it's no big improvement over the old one. A number of companies have introduced full-travel keyboards for the CoCo, and several have been reviewed in *the Rainbow* before. One of these, the Professional Keyboard from Micronix, was reviewed in March 1983. Micronix has recently introduced a new keyboard called the Premium, which is an improved version of the Professional.

The Micronix Premium keyboard is available in two versions. One is used with the "old" Color Computer, which had a RAM size button on the top; the other is for the "new" CoCo, which has the nameplate centered over the keyboard, and also the TDP System 100 and the Color Computer 2. Each version is available for the same price, as opposed to some upgrade keyboards that require an adapter to work with the new CoCo and TDP-100. The Premium (and now the Professional as well) comes with a keyboard driver program called Versakey, which makes use of the four added function keys.

The unit that I tested was apparently an early model, and I got the manual for the earlier Professional keyboard. The installation procedure is apparently identical to that of the older model; I had no problem doing the job from the manual. Absolutely no alterations to the computer are needed, not even cutting down the center support post (which some other keyboards require). In effect, all you do is unplug the old keyboard, plug in the new one and place it on the posts. One minor problem is that the holes may not line up exactly with the posts, but this is solved by holding the front of the case together firmly when you turn it over and then putting the two front screws in first. Seven photos (in the manual that I had) show you the exact procedure.

One thing that Micronix has improved over the earlier Professional is that all the normal CoCo keys are placed in the normal Radio Shack layout. The four function keys are located to the left of the space bar; the bar is now one key width off center, but if you are accustomed to the old CoCo keyboard you will have no problem as the new bar occupies the same width it did before and then some.

Unfortunately, the Premium keyboard has a number of serious shortcomings compared to other keyboards. The first thing you notice when you see the keyboard is that the keys are placed a bit too high, so that you see the key plungers under them. This detracts greatly from the general appearance of the computer. Another is that the letter and numeral keys are gray with white markings, rather than gray with black as on the CoCo keyboard. The white symbols are very hard to read and can actually slow down your typing if you are in the habit (as I am) of looking at the keys as you type. (I apologize to all the typing instructors out there, but I'd rather use a method that works than a "correct" technique that I never quite mastered—especially since I'm constantly switching between two computers on one side of the room and a typewriter on the other.)

The Premium keyboard does have an excellent feel. The ads say that it is an ALPS keyboard (ALPS makes the keyboards in the Model III, the Model 4 and the Commodore 64), but the unit I received was made by Oak, which is better known for cable TV converters and the ON TV pay service. It is, however, very much like an ALPS keyboard except that Micronix has wisely avoided the stampede toward "sculptured" keys in favor of the more normal stair-step layout. A problem with the Oak keys is a tendency for the space bar to come back up slowly after it is pressed; the bar doesn't actually stick, but it is difficult to type a string of spaces quickly.

The Versakey keyboard driver program, which is supplied with the Premium and Professional keyboards, works on 16K, 32K and 64K systems. It apparently doesn't require Extended Color BASIC (although I did not try it on the 8K Color BASIC), and it can be easily backed up and transferred to disk. Versakey lets you redefine any key combination to represent any desired string, so you can set up the keyboard to let you use single-key commands for BASIC statements. You also get a repeat feature, and the cursor is now a blinking black block instead of a multicolored one. The 64K version has a bug that causes the system to crash when you press the [Reset] button; on all size systems, you can't save your redefined key codes, despite the instructions in the manual.

Because of the Premium keyboard's minor problems, I would suggest that you look carefully at it and the other upgrade keyboards on the market before making your choice. It is not only usable but useful, and it will give good service reliably, but you may like another keyboard better.

(Micronix Systems Corp., 8147 Delmar, St. Louis, MO 63130, $79.95)

—Ed Ellers

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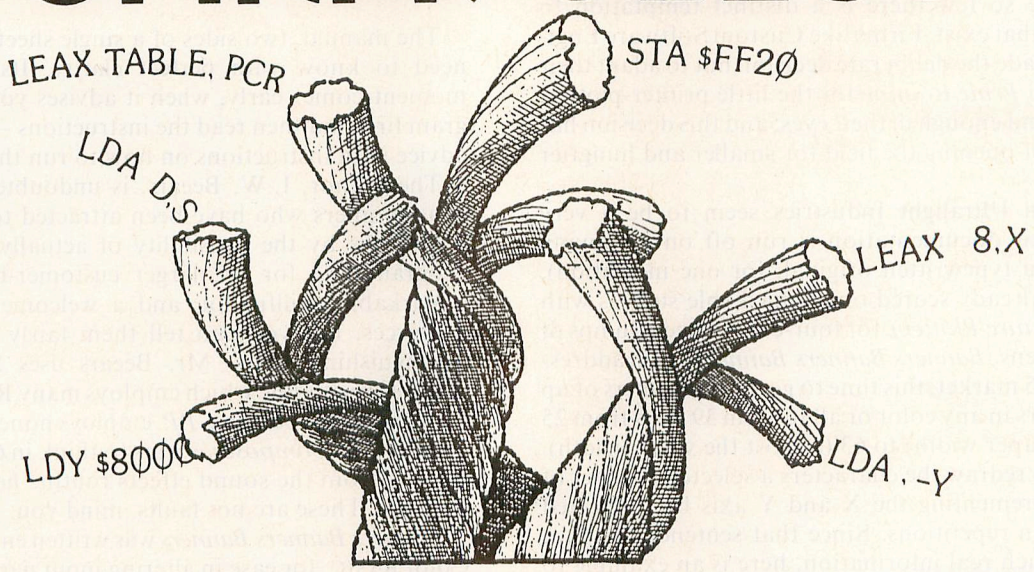

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Learn how the hardware of the Color Computer works. The FACTS and Color Basic Unravelled comprise a complete machine language encyclopedia of the Color Computer.

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Included will be a complete schematic and block diagram of the computer and complete technical information on the key integrated circuits in the computer—6809E microprocessor, 6847 video display generator, 6821 peripheral interface adapter and the 74LS783 synchronous address multiplexer (SAM).

The FACTS is specifically written to provide the information which is needed to write programs which fully utilize the capabilities of the computer. It is the most complete description of the Color Computer, providing more information than the Color Computer Service Manual. $16.95

COLOR BASIC UNRAVELED

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Banners Banners Banners — A Colorful, Large-Character Generator For The CGP-115

Programs written to exploit the capabilities of the CGP-115 plotter are so few there is a distinct temptation to overrate those that exist. Firms like Custom Software Engineering have made the deliberate decision not to adapt their *Graphic Screen Print Routine* for the little printer-plotter, for reasons sound enough in their eyes; and this decision has had the merit of opening the field for smaller and hungrier firms.

All-American Ultralight Industries seem to be a very small firm (their documentation is run off on a copying machine from a typewritten original, for one indication), but they have already scored one remarkable success with *CPP (Color Picture Plotter),* for four-color screen dumps of PMODE 3 screens. *Banners Banners Banners* again addresses the CGP-115 market, this time to generate banners of up to 250 characters in any color or all four, in 39 sizes from 25 (about $^1/_3$ the paper width) to 63 (almost the whole width). Its method is to redraw the characters a selected number of times while incrementing the X and Y axis by a selected amount between repetitions. Since that sentence may not convey very much real information, here is an example to clarify things — 15 repetitions, red, size 25, X increment 1, Y increment 2:

The manual, two sides of a single sheet, tells you all you need to know with perfect clarity. Its most refreshing moment comes early, when it advises you to run the program first and then read the instructions — and follows this advice with instructions on how to run the program.

The author, L.W. Beears, is undoubtedly one of those programmers who have been attracted to CoCo from the SS-50 bus by the possibility of actually making a living programming for the larger customer-base. They are a remarkably skillful lot, and a welcome addition to our resources, but you can tell them fairly easily by certain distinguishing traits. Mr. Beears uses Sugar Software's *Auto-Run* module which employs many ROM calls, but his own machine-code, in *CPP*, employs none; Rich Parry, who gave us *The Composer*, seems to think in 6800 code, as may be seen from the sound effects routine he included in that package. These are not faults, mind you.

Banners Banners Banners was written entirely in Extended Color BASIC, for ease in altering input parameters. No, that does not make the program run intolerably slowly; the CGP-115 would take the same time if written to in C, PL/9 or 6809 machine code. But it does make the misspellings in the screen display a lot easier to correct ("repetitions" is spelled "repitions", for one example).

I would like to report that this is the ultimate banner generator for this printer. It is not. The fault is not Mr. Beears', however, except that he has made use of the CGP's built-in character set, which produces characters not very attractive at best. What he now needs to do is supplement this program with one which will furnish custom character sets, perhaps several of them, for selection by the user.

(All-American Ultralight Industries, 1144 Kingston Lane, Ventura, CA 93001, $9.95 tape)

—R.W. Odlin

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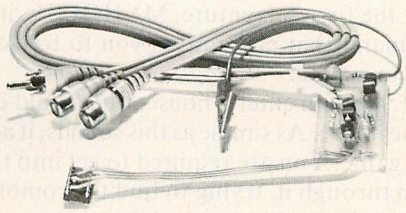

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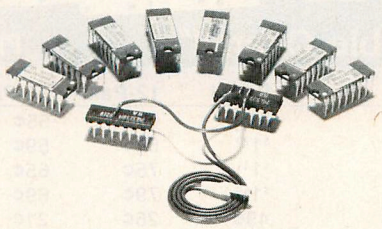

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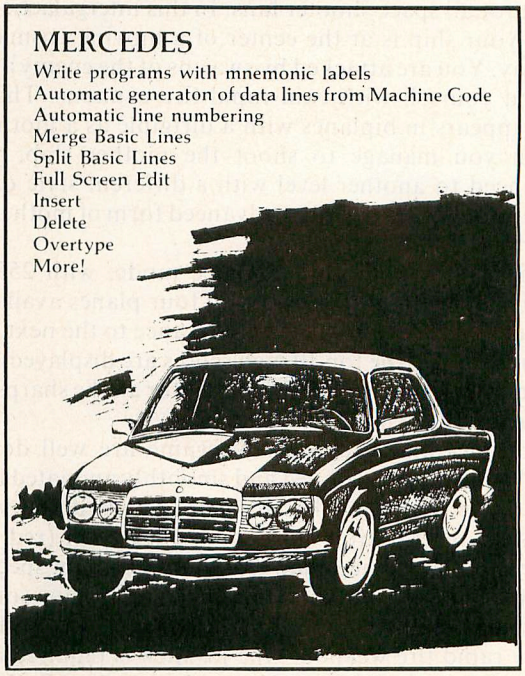

*A M/L utility for the BASIC programmer. Automatic conversion of M/L routines to data statements, automatic line numbering, write MNEMONIC line labels and compile it to a running program. Requirements: MERCEDES 16K, TOOLKIT 16K. MERCEDES alone $19.95. MERCEDES with TOOLKIT $32.95

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Software Review

Time Patrol—A Fun Way To Spend Some Time

Time Patrol, by Computerware, is a great 32K graphics game for all space shooter fans. In this intergalactic Adventure, your ship is at the center of a moving cosmic screen display. You are attacked by swarms of the enemy and must defend yourself with twin rapid fire cannons. The enemy first appears in biplanes with a dirigible as a mother ship. When you manage to shoot the mother ship, you are advanced to another level with a different style of enemy craft attacking and a more advanced form of mother ship to destroy.

The game has both a practice mode, with 255 planes available, and a play mode, with four planes available and extras awarded every time you advance to the next level. In the play mode, the top 10 high scores are displayed between games. This assures bragging rights for all the sharpshooters in the family.

Graphics and sound in this game are well done. The graphics are quite detailed and smoothly animated for good play value. False or aliased colors are used and you may press the reset button until you get the color (red or blue) that you prefer. The sound effects used are not spectacular, but they work well with this game. The gun sounds, in particular, are quite effective in conveying the effect of a heavy rapid fire weapon. One joystick is required and joystick response is quite good using the standard Radio Shack joystick.

The game is supplied on an autoloading tape in Computerware's attractive hanging package. The documentation describes how to load the game by typing *CLOADM,* the basics of how to play the game, one good hint, and instructions on how to get a damaged tape repaired by Computerware. Since this is a copy-protected tape, this is a necessary option even at the price of $5 for tape and $8 for disks.

In summary, I feel this is a well-done game with good graphics and worth the time it takes to load the tape.

(Computerware, Box 668, Encinitas, CA 92024, $26.95, 32K tape; $29.95, 32K disk)

—Charles Bream

Software Review

Great Fun For Beginning Adventurers

The first thing that really impressed me with Owl's Nest's *Adventure Starter Package* was the documentation. While only two pages long, these instructions to the beginning Adventurer are excellent. The explicit information not only goes into how to load the programs, but provides detailed hints and ideas about the Adventure games. If the info sheet is not enough, the first Adventure, MYHOUSE, includes a "HELP" command that encourages you to try something you may not have done.

MYHOUSE has you enter a house, find a gold coin, and escape from the house. As simple as this sounds, it actually is an interesting game. You are required to get into the house and then roam through it, trying to find the combinaton to the hidden safe. Now, I do not claim to be a fantastic Adventure player; suffice it to say that it took me twice as long to finish the Adventure (about a half-hour), than my children. And it certainly did not help when my youngest son thought it was really funny that I was trying the wrong safe combination. They felt the Adventure was a snap and really enjoyed it. I enjoyed it, too.

The directions for loading require you to *PCLEAR0 (POKE 25,6:NEW)* but did not mention that you should also remove the disk controller pack.

When you have mastered MYHOUSE, Owl's Nest Software includes a second program, PIRATE ADVENTURE. This is a litte more difficult to complete and I found that it is quite easy to lose by swimming in the ocean and being eaten by a great white shark (not a nice way to go) or by falling into a pit with no hope of escape (better than being eaten by a shark). PIRATE ADVENTURE has you find the treasure and does become more complicated by requiring you to do things like finding the oars to the rowboat before being able to row.

Both programs do a nice job of developing an interest in Adventure game playing and were enjoyable. Now, excuse me while I try to swim away from that shark again.

(Owl's Nest Software, P.O. Box 579, Ooltewah, TN 37363, $17.95)

—Michael Garozzo

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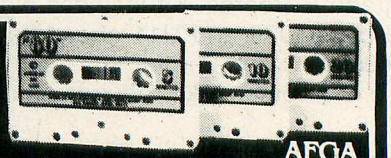

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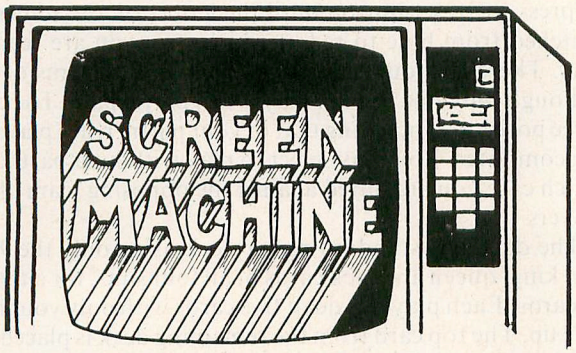

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Euchre — An Entertaining Card Game Of Tricks

Card games have always been a favorite of mine, especially if they require skill as well as a little luck to win. If you win then you can compliment yourself on your high degree of proficiency, and if you lose, well, you can always blame lady luck for having turned her back to you.

Having written the pro-gambler oriented program *Blackjack Royale* for the CoCo, I have a pretty good idea just how difficult and time consuming it is to develop a program that accurately simulates a simple card game. For the author it usually is a labor of love rather than a profit making vehicle, and for the end user it is a dream come true that someone took the time to do it. Many times while reviewing this program I had flashbacks to the time I was developing and debugging *Blackjack Royale* — the ever-perking coffee pot, overflowing ashtrays, gallons of midnight oil and the complaints from others that I was spending too much time hacking away! It is hard not to feel a kinship towards the author of this program I am reviewing.

Euchre is a perfect example of a card game that can be converted to run on a computer to entertain and challenge. During the late 19th and early 20th century, Euchre (pronounced "You-ker") was the most popular card game in the United States because of its simplicity and fast play. Since most variations of the game require at least four players, it lends itself well to family play, a fact which must have contributed to its widespread popularity. Many versions exist that were transplanted from England, France, Ireland and Germany with this adaptation most closely resembling the version called "Hasenpfeffer" developed by the Pennsylvania Dutch, although it does not exactly match any variation listed in the rule book of games "according to Hoyle." The game of Euchre can best be described as a game of war with many subtleties and fine points to make it more interesting and challenging.

This 32K version is written in BASIC using PMODE 3 graphics and is available on cassette or disk. The program is not copy protected; in fact, the manual advises the user to make backup copies just in case the glitch fairy steps on your master copy. (My word, not theirs!)

After loading and running the program you are prompted to press the reset button until the letters on the screen are switched from blue to red at which time you are ready to play. There are four players grouped in two teams of two, although only one human player can participate. The other three positions, including that of your partner, are played by the computer. You may select to play without a partner, in which case you are pitted against the opposing team of two players.

The deck is a standard poker deck using only the 9, 10, ace, king, queen and jack cards of all four suits, for a total of 24 cards. Each player is dealt five cards with only your hand face up. The top card from the remaining deck is placed face up as a proposed trump suit that players have a choice of accepting or rejecting. The players, in rotation, place one card from their hand in the center after establishing the suit for that round of play. The team with the highest card value gets the "trick" and the point for that round of play. After five rounds of play the team with the highest number of tricks gets the point for that hand. New rounds of play are completed until one team scores a total of 10 and is declared the winner.

The graphics are quite good with the card faces very similar in design to the video card gambling machines found in Nevada casinos. Sound effects are used very sparingly, but with good effect, as a beep is heard when each card is dealt or played. This seems sufficient without being distracting to the player.

The documentation is poor in both content and quality, consisting of four pages faintly painted on one side only, with a line width of about 50 characters. A description of the rules and play of the game is given in detail using terms such as left and right Bauer-Jack, trump suit and trick. Inexperienced card players may be unfamiliar with these terms and may have to refer to a book on card games to comprehend them as they are essential in understanding the hierarchy of card values.

In two ways *Euchre* could be considered a "classic." It is an excellent, well-written and entertaining program that plays well and shows what can be done with graphic commands, well-designed screen formatting and tightly-structured programming. In quite another sense it is a classic example of a good program being weakened by poor documentation, which assumes prior knowledge of the game.

All things considered, however, I would recommend *Euchre* to anyone who likes to spend cold winter nights playing card games against the computer. Card game addicts will find *Euchre* to be a welcome addition to their program library.

(Chroma Systems Group, P.O. Box 366, Dayton, Ohio, 32K ECB tape $19.93)

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Pager/64K Boot— Two More Utilities For CoCo

Skyline Software has come up with two utility programs that are for 64K CoCo owners only. If you don't have 64K, read this review anyway; it will give you a sampling of just what you are missing!

The first program, *Pager*, makes use of the 6809's ability to select separate 32K banks or pages of memory. To load, first clear some string space and reserve a spot in upper memory for the program. The normal *CLOADM* and *EXEC* commands start the program. At this point you are presented with a menu of five options to choose from and also what page you have selected, Page 0 or Page 1. The first option duplicates the menu and switches you to Page 1 or vice versa if you are already in Page 1. Option two allows you to copy a BASIC program from the present page to the other page. Number three will copy a specified area of RAM from the present page to the other, you supply hex start and end addresses for this step. Option four will swap the entire contents of each page with each other from 0000 up to the area you protected before loading. Finally, choice five lets you get back to BASIC. Anytime you want to jump back into the program just *EXEC* and you will be back in the menu mode.

Besides demonstrating some unique features of the 6809 CPU, you may be asking yourself, "can this program do anything useful?" Probably the most common usage will be in modifying or editing an existing BASIC program. Your original program can reside in Page 0 and the modified one in Page 1. This way any changes in program operation can be checked just by changing between pages and comparing their operation with one another. If your modified program crashes you have a "backup" on Page 0 to save you. Or, let's say you are ready to *CSAVE* your favorite many line program; just copy it into both pages and *CSAVE* to tape. If you cannot *CLOAD* due to a bad tape or whatever, you still have a "backup" on Page 1 to try again with.

The second program supplied is *64K Boot*. This enables you to copy the material in ROM to RAM and puts the CoCo into the 64K mode. The main advantage in having ROM in RAM is the ability to modify BASIC. This requires a knowledge of the BASIC memory map so you can poke in various changes such as Baud rate or even the stepping rate of a disk drive.

The documentation is brief but more than enough to get started. Also included is the assembler source code for both programs—a treat for ML buffs.

(Skyline Marketing Corp., 4510 W. Irving Park Rd., Chicago, IL 60641, cassette $19.95)

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The Complete Personal Accountant — An Excellent Financial Package

The *Complete Personal Accountant* is an excellent piece of software that has been developed for the Color Computer. This package seems to be able to produce all the information that an individual would need to know about his financial health. I'm sure that would apply to a small business also. To use *CPA*, you will need a Color Computer with Extended BASIC and either one disk drive or a cassette recorder. There are two versions, 16K and 32K. (If you purchase the 16K version for disk, you must store some data on cassette because of memory constraints.) It is not necessary to have a printer but, I personally wouldn't want to use a program of this quality without one.

I'm not going to be able to cover all the bells and whistles of this package, but I will cover the main features and describe the function of each of *CPA's* ten programs. I am reviewing the second edition of the disk version. It comes packaged in a three ring binder with 153 pages of excellent documentation. At first I got a little irritated at the author because I felt the documentation had too much repetition, but then I realized it was written this way so that once you have initially set up your files you can utilize any of *CPA's* ten programs without having to backtrack through the manual to figure out what you are doing. The manual is broken down into three sections and at the end of each of these sections are some examples of what your reports should look like. The only criticism I have of the documentation is that the three ring binder has ½" rings and this makes it quite difficult to flip the pages without tearing.

With *CPA* you can: record checks and deposits; balance your checkbook; record savings, loans and investments; print checks; budget your spending and savings; graph financial information; keep track of bills and appointments; and print a mailing list. In order to do all these things, there are ten different programs that you can call from a menu. Many of the programs work together to give you the information you want, but I am going to try to describe each one separately for the purpose of this review.

Chart Of Accounts — This program allows you to establish your own unique set of accounts (up to 99). Each account is assigned a number from 1 to 99 in the following manner: Asset Accounts (1-20), Liability Accounts (21-45), Equity Accounts (46-50), Income Accounts (51-60), and Expense Accounts (61-99). An account can then have up to nine sub-categories. For instance, if you had an expense account set up for medical, you could then set up subcategories for each doctor, the hospital, drugs, etc. The only limitation is that the total number of accounts plus subcategories cannot exceed 241. Each account name can be any combination of up to thirty letters and numbers. Each subcategory can be up to fifteen characters long. The package comes with 66 accounts already named and numbered for you. You can add to or change any of these if you like. Adding, changing, or deleting an account is a breeze and as long as you use the save option every time you make changes you will have a current chart of accounts.

Checkbook Maintenance — This program will keep a record of all your checks, deposits, service charges, and payments on any of the accounts set up in your Chart of Accounts. It will assist you in keeping track of tax deductable items and help balance your checkbook. In addition to keeping track of individual checks you have written, you can use *CPA* to break a check down into as many as 25 separate accounts. Let's say, for example, you use a credit card to purchase gasoline, some clothes, concert tickets, and new software or hardware for your Color Computer. If you pay off this bill with one check, you could assign portions of the check to the appropriate accounts. Balancing your checkbook is easy with this program. Of course, if it doesn't balance you will have to put forth a little effort to find your error, but it should be easy if you print out the checkbook and compare to the bank's statement. You can print a copy of your checkbook at any time for any month. The printout will give you the totals for deposits, checks written, and tax deductable items. If you want, *CPA* will even print checks for you. I must say though that I wasn't impressed with this feature. I printed out some checks on regular printer paper and it used practically the entire eight-inch width for the check. It would have been nice if the documentation gave some hints on how to customize this for your own checks or at least information on where the checks the program was designed for could be purchased. One other thing that might cause you a problem is that the description of each check you enter is limited to

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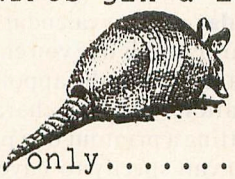

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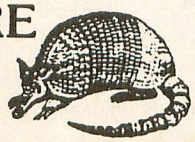

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just 15 characters. This means that when you want to write a check the payee's name must be limited to this same 15 characters.

Checkbook Search — This program will allow you to search your checkbook by check number, deposit number, description, date, or account number. For example, you could get a printout of all the checks you wrote for food during the year. There is also a browse option which will print the entire checkbook on the screen or printer.

Detail Budget Analysis — This program allows you to create a budget and compare your actual spending patterns to your budget. At any time you can add, change, or delete a budget record. You also have the option of searching through your budget file forward or backward sequentially, or look for a particular item with the search option. You have the ability to analyze your budget to your heart's content. If you want you can produce a report of all the checks you wrote against each budget account. This report can be sorted by account, subcategory, check number, date of check, amount of check or the payee.

Summary Budget Analysis — This program will print a summary of your budget so you can tell at a quick glance how you are doing compared to your budgeted amounts. This report is actually a summary of the Detail Budget Analysis.

Net Worth/Income Expense — This program will keep track of all your finances. You can print a balance sheet that shows your assets, liabilities, and net worth. You can also print an income/expense statement. A lot of the information for these statements comes from the entries you make in your checkbook. There may be some things though that you do not process through your regular checking account such as the software or hardware you purchase for your computer that you don't want your spouse to find out about. These items can be entered into the file with a maintenance option. You can enter information such as the outstanding mortgage on your home, etc. When you finally get all the necessary data entered, you can print out a balance sheet to income/expense statement that looks just as impressive as the ones you see in corporate annual reports, only yours probably won't have as many trailing zeroes as theirs.

Payments Calendar — This program allows you to enter four pieces of information about those periodic bills you have to pay. The information is: bill name (or payee), amount of bill, month due, and the date due. If the bill is due every month then you can enter a special code and it will be included in the calendar every month. Once you have all this information entered you can get a printout showing when each of your bills are due during the month, how much they are for, and to whom they are to be paid.

Appointments Calendar — This calendar is quite similar to the payments calendar. For this one you enter three pieces of information: appointment month, appointment day, and appointment information (up to 24 characters). You then have the option of getting a printout of a particular month's appointments or you can specify to have the printout list those appointments between any two days you select.

Mailing List — This program will allow you to establish a mailing list and then print out the addresses on envelopes to mailing labels. The documentation doesn't say how many addresses you can store. This isn't as fancy as some of the mailing list programs on the market, but it will meet the needs of most users. Once the addresses are loaded you have the option of changing or deleting the addresses, and of course you can always add addresses. If you are looking for a particular address you can search by account number, addressee, address, city, state, or ZIP code. In regard to printing the addresses, you must either print all addresses or you can select one address at a time to print out. The program is set up to print single width labels.

Color Graph — This program allows you to print graphs of any of your financial records on the screen. The graphs are quite impressive and will allow you yet another method of analyzing your financial records. If you are really ambitious you may be able to incorporate one of the screen print programs to this one to get a print out of the graphs on your printer.

As you can tell, I'm quite high on *CPA*. It is an easy program to initially set up and use. The documentation is written in such a manner that if you only use the program once a month, you don't have to read the entire manual to figure out what to do to get the information you want. You just turn to that section of the manual and follow the instructions. Although I did mention a few things I didn't like about this program, they are primarily trade-offs the author had to make because of memory limitations, etc. I certainly would recommend this program to anyone with a need in this area.

(Programmer's Institute, P.O. Box 3470, Dept. R, Chapel Hill, NC 27514, $79.95 disk, $74.95 cassette)

—Michael K. Hunt

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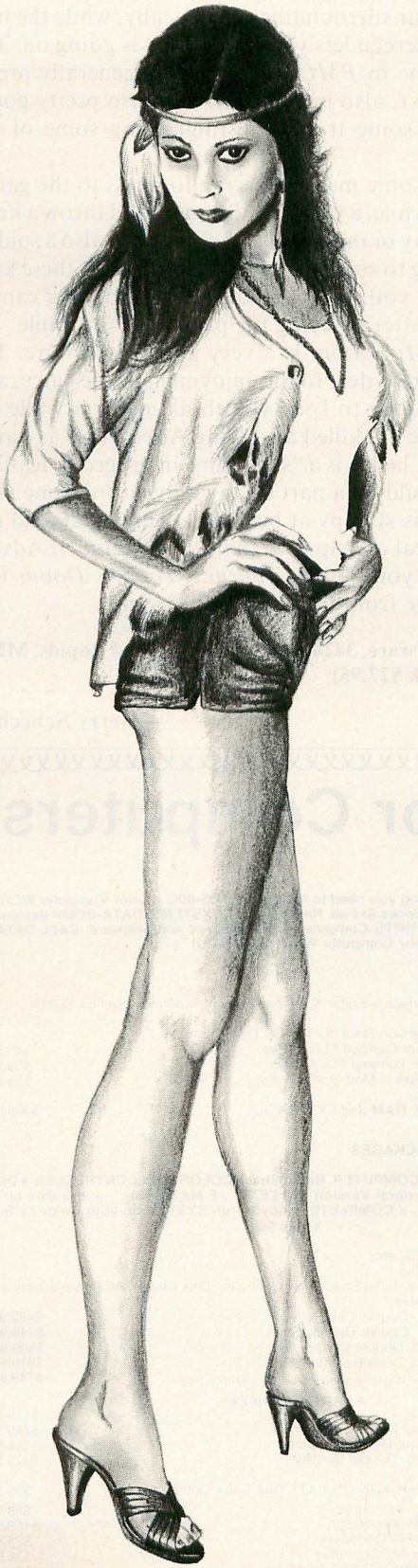

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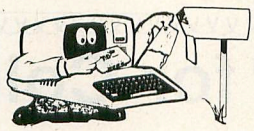

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Mt. Doom — A Good Disk Based Adventure

Adventure games are nothing new on the CoCo software scene. In fact, the first program I bought for my CoCo was just such a game. Since then, CoCo has expanded greatly, both in the hardware and software departments. With 32 or 64K, and a disk drive, much more sophisticated software is possible. Fortunately for us, the CoCo software vendors have seen fit to take advantage of these increased capabilities. This applies not only to games, but to the more serious applications as well.

Journey To Mt. Doom is a 32K disk-based graphics Adventure. The program itself is written in BASIC with machine language subroutines. The disk contains the graphics for the various locations, which are loaded directly into graphics memory as you move from one location to another. Although this process slows the game down to a small degree, it is much faster than having to draw the graphics on the screen each time.

The object of the game is to prevent the "Necromancer" from waging war on the earth. To do this, you must first find the "magic ring," then make your way to Mt. Doom and destroy the ring, and finally return to your starting location. Naturally, there are many obstacles along the way, as well as some treasures to be found. Your score, if you survive, is based upon whether or not the ring is destroyed, and upon the amount of treasure you can bring back with you.

Playing the game is very easy. By using one- or two-word commands, you tell it what it is that you want to do. For example, you can TAKE an object, LOOK at your surroundings, get an INVENTORY of what you are carrying, and move NORTH, SOUTH, EAST, or WEST. There are other commands as well, but it is up to you to figure out what they are.

While you are playing the game, the upper half of the screen shows your surroundings graphically, while the bottom half of the screen lets you know what is going on. The graphics are done in *PMODE 3*, and are generally pretty detailed. The text, also in *PMODE 3*, is also pretty good, although I had some trouble distinguishing some of the letters at first.

There is also some measure of randomness to the game. Every once in a while, a Goblin will appear and throw a knife at you, which may or may not be fatal. There is also a spider, who comes along to steal one of your treasures. If these kind of things annoy you, the odds of them happening can be easily changed, after studying the program for a while.

Journey To Mt. Doom is a very good Adventure. The graphics add a great deal to the enjoyment of the game, and it is difficult enough to keep you thinking for a while (or forever if you are as skilled at solving Adventures as I am). The only thing it lacks, is a "save game in progress" feature, which I feel should be a part of any Adventure game. The documentation is skimpy at best, but then you should not expect a great deal of help with this type of game. If Adventure games are your thing, *Journey To Mt. Doom* is a refreshing change from the "text only" variety.

(Tom Mix Software, 3424 College N.E., Grand Rapids, MI 49505, 32K disk $27.95)

—Gerry Schechter

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You've heard it said before, but I'll say it again: "If you have a disk system, then sooner or later a disk with your favorite/most critical program will crash!" And probably *without* a backup copy. So, you owe it to yourself and your CoCo, not to mention your loved ones who hate to see you beating your head against the wall, to get one of the disk fix utilities which is out on the market. I kept putting it off and between luck and taking good care of my disk and disk drives I didn't have much trouble. But, sure as Murphy, a couple of weeks ago my "working-on-it" disk, with over 40 man-hours of partially completed programs, bit the big byte. AARRRGGGHHH! I put the disk away for future salvage and luckily for me the review assignment that I received this time is *DISKEY Disk Access and Repair Key* from Adventure International. Serendipitous, yes?

I haven't seen any of the other disk fix utilities available in actual operation, so I can't really make any comparisons. But I do know that *DISKEY* does everything their ad says, and even has a "bonus" or two.

One thing I remember mentioned in a review of one of the other programs was the learning method used was to have you reconstruct the program disk itself, and *DISKEY* does this also. In addition, the information in the documentation is worth at least one-third of the price by itself. The documentation was *very* professionally done as you might expect from a company like AI, who has finally started supporting the CoCo (we knew it was worth it and I think now everyone else knows, too). It comes in a nifty 6 x 7 three-ring binder which contains the disk also and has fifty pages of instructions, info, tables and charts. My only minor complaint being that the copy quality of a couple of tables "faded" in places probably due to being line printer output rather than being typeset like the rest of the book.

You are given instructions on the operation of the program first. Then there is a tutorial on just how the RS Disk System sets up its directories files, etc. Following that are samples of the charts to be used when the program is run (see listings below) and tables of very useful information. Then there is the "walk-through" of how to recover the other two programs on the disk. These turn out to be a BASIC program that will act as a menu-driver for your disk allowing you to select and execute any program on your disk. One normal save and one in ASCII format to help you learn the differences between the two so far as recovery is concerned. There are also samples of the printouts available from the program.

The main program is actually two programs in one: the *DISKEY* section and a diagnostics section. The diagnostics test CoCo thoroughly and almost anything else you might have hooked up (disk, tape, printer . . .). Everything here is pretty much self-prompting and there is a section in the back of the book explaining all tests. Like the documentation this section alone is worth part of the price all by itself.

The main two routines of *DISKEY* are Disk Map and Examine Edit. Disk Map draws a graphic map of the disk being checked and color codes any sectors that have Read/Write/IO Errors so you know if your problems are firmware related or software giltches. Then Examine/Edit allows you to check data in all sectors and directly edit anything you find. This is where you collect the data needed by the Reconstruct Directory section that you learned how to do in the "walk-through." The other routines available are:

Erase Disk — which "zeros" a formatted disk by writing FF hex to every byte.

Backup — which works like BASIC's but keeps you informed as it goes.

Copy — which copies by track numbers specified.

Print Directory — with a little more information.

Calibrate Drive — which is actually sort of a *MOTORON* for disk allowing you to perform some of the care and maintenance which is also outlined in the book (along with a safety warning and the advice not to try anything if you don't know what you are doing).

The only trouble I had with the program itself was that the arrow key movement around the edit display was touchy as heck and made it hard to put the cursor exactly where you wanted without overshooting a couple of times. Also, it would be nice if the examine section did a quick run-through of the disk and told you which granules had active sectors in them. You would still have to examine them "by hand," but it would be quicker than checking each gran yourself, especially if you're not sure how full the disk is.

But, these are only nit-picky details in a very professionally done program that does *so much!* By all means, if you have disks and don't have a disk repair utility then *DISKEY* would be an excellent choice.

(Adventure International, Box 3435, Longwood, FL 32750, disk $49.95)

—Bruce E. Sterling

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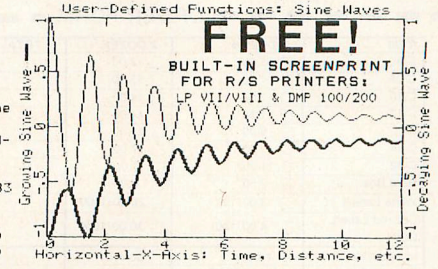

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Clock Drill: An Education, Timely Tool

If you're among the fathers who, after mom has left for work, find yourself constantly telling the youngster to get his school clothes on, that we're running short on time, you will appreciate *Clock Drill*, an educational program from CY-BURNET-ICS of Knoxville.

Clock Drill is an autoload program requiring 32K, is menu driven and is designed to be both student and teacher friendly.

A large analog — you remember, the old kind, round and two revolving hands — clock is displayed on the screen for each problem. A seven-menu item offers the following options:

— On the hour.
— Half hour.
— Quarter after.
— Quarter till.
— Hour, 15 after, half hour, 15 till.
— Five minutes.
— By the minute.

On each screen, the computer randomly selects the time appropriate to the menu option. The student inputs the answer in a digital display at the lower lefthand part of the screen. If the selection is incorrect, a low buzz sounds indicating that he or she needs to try again. At any rate, the answer must be correct before going on to the next problem. Get it right and there's a neat little tick-tock, tick-tock sound for a reward.

A grandfather clock, complete with pendulum and a selection of "Hear the Chimes Ring," awaits the child when he makes 12 correct answers in a row.

A nice feature, especially for those who are in the early stages, is the presence of a help key, which, when pressed, signals the numeral representing the correct hour on the clock.

Pressing the spacebar once will display minutes incremented by five around the clock face. A second tap erases the display.

Included as a bonus with each program is *Clock Classroom Tutor*, which the creators say has been used in the classroom in Knox County, Tenn., for individual and large group instruction. It allows time comparison by the clock face, digital notation, and by spelled-out versions. It also includes placement and significance of the minute hand, and increasing difficulty as the program progresses.

For teachers in the lower grades who have had difficulty in locating good educational programs to go with those new-fangled computers that the board of education has placed in their classrooms, *Clock Drill* is for you.

(CY-BURNET-ICS, 5705 Chesswood Drive, Knoxville, TN 37912, $24.95 on tape)

—Charles Springer

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The instruction manual describes how to take full advantage of the power of this versatile programmer. We think you'll agree, that never before was an EPROM programmer so easy to use, and feature packed as is the 1248-EP.

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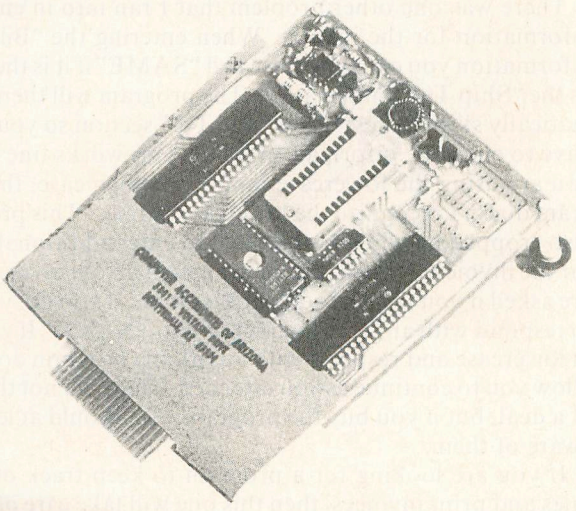

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Order Entry System Provides Sales Help

Order Entry System is a neat little package that a small business could use to print invoices and keep track of sales. To use this program, you need at least a 32K Color Computer with one disk drive, and an 80-column printer. The documentation also says you need the Mark Data Products *Super Screen* program which is included on the disk. The *Order Entry System* is actually a combination of several programs that are menu driven.

In order to tailor the program to your specific needs, you will have to delete some data statements that are used for the demonstration program and include some of your own. You may also need to make some other changes to make the program compatible with your printer. This is really no problem, though, as the instructions are written quite well.

With *Order Entry System*, you will be able to print: Invoices, Sales Reports (either daily, monthly, or for any other period), and a Receivables Report. Creating, modifying, updating and maintaining the data files is quite easy. As I mentioned earlier, there is a demonstration program used as a tutorial that will have you capable of operating and understanding the system within one hour. The documentation (23 pages) is written quite well. There was one place, however, where the documentation could have been a little more clear; that is in the tutorial section on reviewing records. The tutorial tells you to type in the record number you want to review. The only problem is, you don't know how many records there are yet unless you are very perceptive and noticed it on the screen. Anyway, as long as you press the number 12 or less you will be okay.

The heart of the *Order Entry System* is the *SALES.BAS* program. This is where you actually enter your sales orders and prepare the invoices for shipment. With a single disk system you can enter up to 488 transactions and, with two drives, you can store over 600 transactions.

A sales order is either *closed* (cash, check, money order, credit card) or *open* (C.O.D. or open account). As you enter each order it is placed in the appropriate open or closed file and a multiple copy invoice is prepared. (The documentation does include a sample of the type of invoice the program is written for.)

When you receive payment for an order that is on open account or a C.O.D. you can credit the account by selecting the "close and open order option." To enter a sales order, you will be asked to input the following information: Ship To, Bill To, Purchase Order Number, Method of Shipment, Terms of Sale, and various Product and Discount Information. You do have the option of combining sales of products that have different discounts on a single invoice. You also have the option of adding tax, C.O.D., and handling charges to the invoice.

The other options of *Order Entry System* allow you to print out reports of closed orders (sales) and reports of open orders (receivables). The report of closed orders will print out the following information for each order: invoice number, date of transaction, terms of sale, net sale, tax, shipping charges, C.O.D. charges, and the total sale price. Once this information is printed out you will get another report which gives you a sales breakdown. The sales breakdown will tell you how many of each item you have sold and the total amount of revenue each item has produced. This report will also tell you how much of your total receipts was Cash/Money orders, Checks, or Credit cards. The report of open orders will print out the same reports but will be for invoices you haven't received money for yet. The reports can be requested for a single day or the entire month.

In general, I feel this is a good program that would serve the invoicing needs of a small company quite nicely. There are a couple of items, though, that are quite inconvenient and may cause you some concern. When entering information for the invoice, if you realize you made a mistake a couple of lines above, you must use the [up arrow] to get to that line. This would be no problem *except* that it *wipes out* all the information between your current line and the one you are going to. It would have been nice if the program had a feature that allowed you to select the line number that needed correcting like many other data entry programs do.

There was one other problem that I ran into in entering information for the invoice. When entering the "Bill To:" information you can type the word "SAME" if it is the same as the "Ship To:" information. The program will then automatically skip the rest of the "Bill To:" section so you don't have to enter the information twice. This works fine unless you are using the lowercase mode, in which case, the program doesn't recognize the lowercase "same." This problem also cropped up when I attempted to enter additional items for the invoice. As you complete an item on the invoice, you are asked if you want to add another item. If you do, you are to respond with an [N] which represents "NEXT." If you are in lowercase and respond with an [n], the program does not allow you to continue as you intended. These are not that big of a deal, but if you buy the program, you should at least be aware of them.

If you are looking for a program to keep track of your sales and print invoices, then this one will take care of these needs quite well.

(Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, disk $99.95)

—Michael K. Hunt

Hints . . .

Color Computer 2 Warning

If you are upgrading your new CoCo 2 to 64K, remember that the 16K chips you are taking out are *not* the same as the 16K chips (type 4116) that earlier CoCos used; they are type 2118, which use a different power supply (+5 volts only) and *will not* work in earlier units, and could cause damage. (If you intend to do a 32K "piggyback" expansion on your CoCo 2, use another set of 2118s, *not* 4116s that came out of an older computer.)

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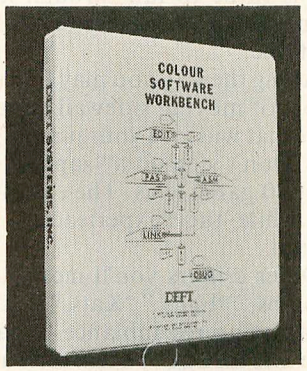

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  - Multi-Dimensioned Arrays
  - Records and Variant Records
  - Sets of Up to 256 Elements
  - Files
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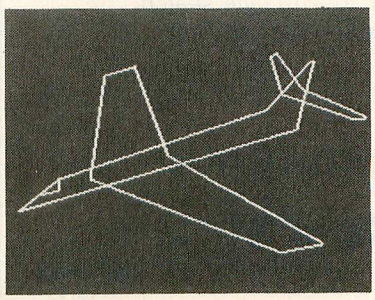
- Statements: IF, WHILE, REPEAT, CASE, GOTO, EXIT, FOR, BEGIN, assignment (:=)
- Input/Output: RESET, REWRITE, READLN, EOF, WRITE, WRITELN, CLOSE, PAGE
- Built-in Functions and Procedures: ABS, CHR, CURSOR, ODD, ORD, PRED, SUCC

ADVANCED PASCAL
- Strings Support: Assignment, Comparing, Concatenation
- String Procedures and Functions: STRINGCOPY, STRINGDELETE, STRINGINSERT, STRINGPOS, HEX, ENCODE, DECODE
- Type Extensions for Structured Type Breaking
- Absolute Memory Access via Built-in WORD and BYTE Arrays
- ROM Routine Access via CALL Built-in Function
- Static and Public Variable Allocation
- Separate Compilation and Assembler Interface via INTERFACE, EXTERNAL, and PUBLIC
- Listing and Multiple Source File Directives
- Explanation of Error Messages

6809 MACRO ASSEMBLER
- Motorola Compatible Source Conventions
- Macro Facility With up to 9 Macro Parameters
- Separate Compilation and Pascal Interface via PUBLIC and EXT Directives
- Listing Control Directives
- Explanation of Error Messages

TECHNICAL NOTES
- CoCo ROM Compatibility
- Pascal Runtime Library Assembler Interface
- CSW Object File Format



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Cashman: A Fun Investment

One of the main reasons I bought a CoCo was to play colorful arcade games, so I'm always glad to get the opportunity to review one. I did, however, experience one very small problem in reviewing *Cashman*, which I'll tell you about shortly.

But first, let me tell you about the game. *Cashman* is a 32K self-starting, machine-language game from Computer Shack, available on disk or cassette. Although it may appear to bear some superficial resemblance to *Canyon Climber* or *Donkey Kong*, it is totally unique.

One thing that makes it quite different from any other video games I have ever seen is the fact that, when two players are competing, they do not just alternate taking turns. They actually play together on the same screen, vying for treasure and hurling eggs at each other. (Hurling eggs? That's another unique feature!)

There are more than 40 screens. The instructions do not specify how many more, but since "experts" may *begin* playing on screen 40 if they wish, I wouldn't be surprised if there are more than 50!

In a two-player game, one player uses the left joystick to move a character called the "Sheik," and the other player uses the right stick to control the "Sailor." In a one-player game, you can pick either one. Although the Sheik has a blue hat and orange shoes, and the Sailor has a white hat and blue shoes, these distinguishing features are very small, and while playing the game with my wife, I occasionally found myself trying to move the wrong character after they crossed paths on the screen.

The object of the game is to clear the screen of $50 bills, represented by dollar signs. You move horizontally along "girders," or vertically up or down ladders or ropes, called "climbers." Jumping is accomplished by pressing the fire button. Unlike some other well-known climbing games, there's no penalty for taking a fall. (In fact, on some screens, the only way to collect a dollar sign suspended in mid-air seems to be to fall through it.) When you collect all the money on one screen, you're automatically advanced to the next one.

Along the way you may find some "conveyors," which are a sort of moving sidewalk, and "flingers" — little trampolines that will give your jumping and extra boost. But watch out: Don't step on a "zapper" — that will cost you one of your 10 game lives. The easiest screens have no zappers at all, while the "experienced" and "expert" screens have several.

Other critters you'll meet during your treasure hunt are "Bombs," "Eggs," "Kats," and "Byrds." (The last two bear an amazing resemblance to cats and birds.) A Bomb will turn into an Egg or a Kat after a while, unless you grab it first (which scores $30 for you). If you get hold of an Egg, you can throw it at your opponent (costing him one game life), a Kat (good for $150), or a Byrd ($250!). If you don't grab an egg, it will soon hatch into a Byrd.

Run away from Kats. Contact with one costs you a game life. The Byrds can be helpful. If you let one grab you, it will lift you up to a higher elevation. On some of the "no jumping allowed" screens, that seems to be the only way to get up there. Of course, there's always the danger that it will drop you off right in the path of a Kat.

The screens are divided into six "areas." The first four are "easy." The next six are "super jump." As the name implies, all the jumps are much higher. There are 12 "moderate," five "no jumping allowed," and 12 "experienced" screens. After all that comes the "expert" area which begins with number 40. You may choose to start at number 1, or you may start to play at the beginning of any of the areas. That way, the great players can go directly to a level that challenges them, while novices like me can at least get a look at what the higher levels involve.

There is a scoreboard that keeps track of six high scores —but your first six games won't automatically earn a place on it. Arbitrary scores have been assigned to six characters with funny nicknames, and you'll have to beat at least one of those to earn the right to enter your name.

There's even an alternate color set. The normal colors are orange, blue and white on a dark background with a white border, but by depressing the spacebar at the start of each game, you can shift to pink and green graphics on a white background. I found this alternative color set a bit fuzzy and hard to play with, but I suspect that that is probably the fault of my very old color TV rather than the program.

The instructions are well-written and easy to understand. Although it may sound complicated, once you start playing you'll find it very easy to get into.

As I mentioned earlier, I had one small problem in trying to review *Cashman*: I found it very tough to tear myself away from *playing* the game long enough to write about it!

In short, *Cashman* is one fun game. Buy it.

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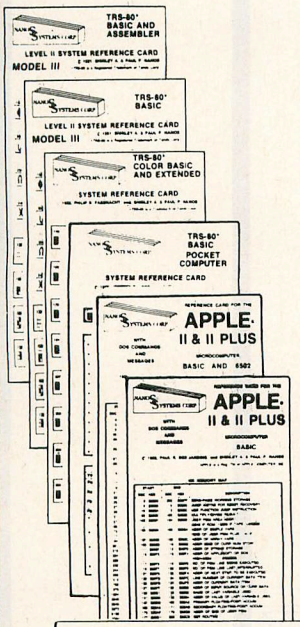

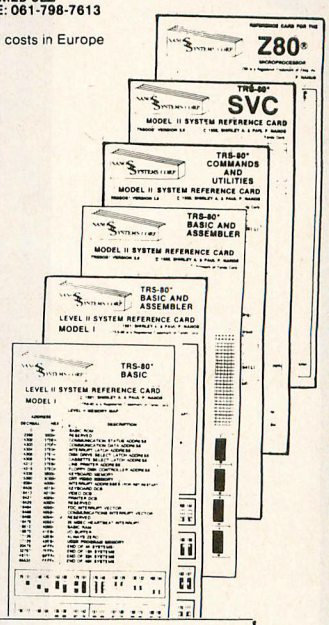

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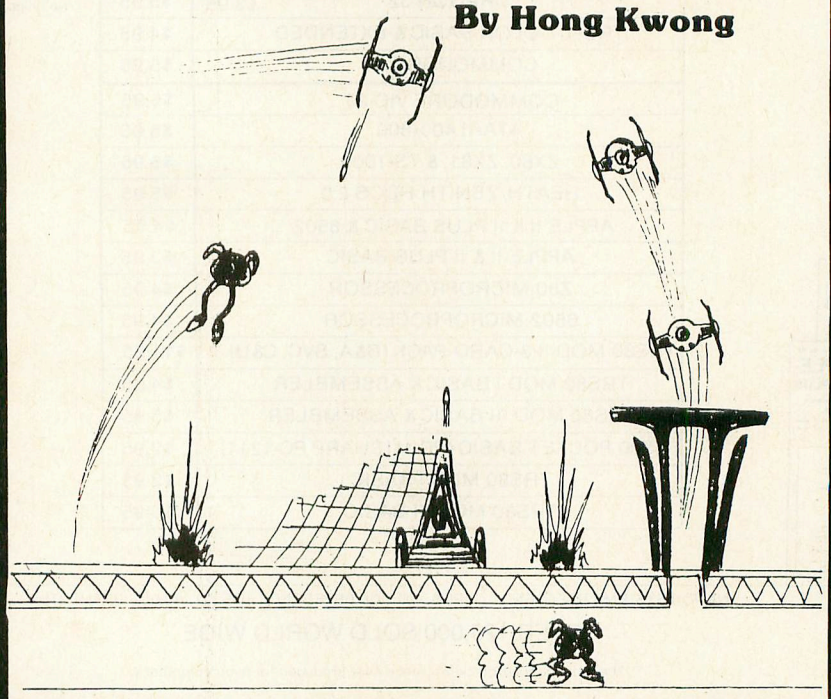

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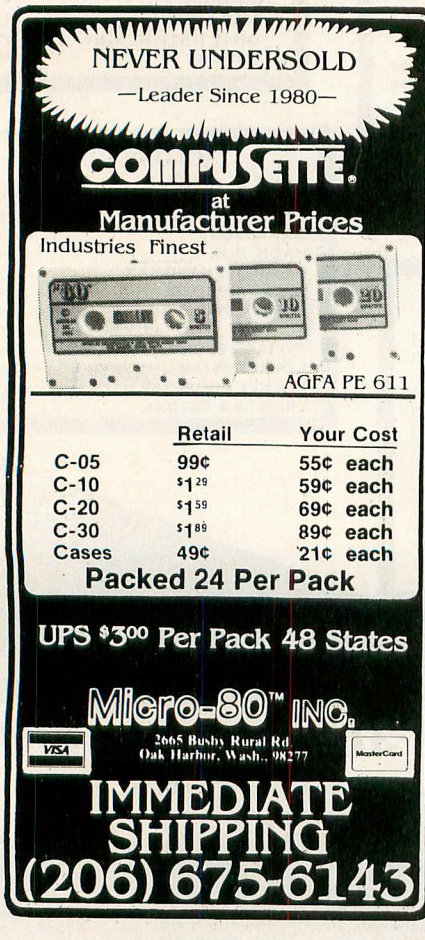
Key-264K — The Key To Flexible Programming

By Donald D. Dollberg

Being somewhat of an old timer with the Color Computer, having started with a 4K Color BASIC machine over two years ago, I've had the opportunity to watch the growing and continuing support from third party software vendors. I've also had the opportunity to upgrade that 4K machine to 64K Disk Extended BASIC with new keyboard and video monitor. With the wave of new 64K machines, comes what I call 64K hysteria — "What can I do with 64K?" Everyone I know is convinced that OS-9 is the answer. Sure, it's a great system and adds tremendous capability (and prestige) to CoCo. If you're into heavy programming or need to use some heavy business type software, then OS-9 (or FLEX) might be the answer. But, what about the casual BASIC programmer who is happy with Color TRS-DOS? I believe that *Key-264K* by Key Color Software is the answer.

Key-264K, by Neil Capeless comes on a cassette and requires Extended BASIC and good 64K RAMs — the so-called half good 64K chips which Radio Shack presumably put into the early 32K CoCos, will not work. The program is protected with an auto start loader and cannot be copied to disk although it is fully compatible with Disk BASIC. Although the program is small, 3.225K bytes and loads quickly, some disk users may be irritated having to resort to tape. I spoke with Mr. Capeless about this and he assured me that a disk version was available since January. Those who already have the tape version may upgrade to disk for a modest upgrade charge of $5 plus shipping. Disk versions are available for both the 1.0 and 1.1 Disk ROM.



In addition to the program, a 75-page manual is included. Present software authors would do well to emulate Mr. Capeless' documentation. This is a professional product which is extremely well written on high quality paper and obviously offset printed. The first 50 pages are devoted to a tutorial or learning guide. It is designed to be used while working with the system. Each command is fully discussed with examples to be entered into the computer. After running each example, the command is then summarized with reinforcement. By working through the tutorial, one develops a basic understanding of each command. But, as with any new system, there is often the need to refer to the manual. The last 25 pages of the documentation serve as a reference manual. Now this is not just a list of commands either. Each command is summarized on a separate page. For each command, four topics are listed: command format, purpose, comments and examples. Each page is neatly presented in outline format so it is very easy for the eye to scan the page for the needed information.

I realize that I have spent a lot of time commenting on the manual but high quality documentation takes a lot of time to produce and should not go unrecognized. Anyone, even with a very elementary understanding of BASIC, will appreciate the manual and find it very easy to read and understand.

Before I get into the details of this utility, I think that it would be useful to quickly review the two memory options available with a 64K RAM machine. On power up, the SAM (6883 synchronous address mutiplexer) configures the system to the 32K ROM/32K RAM mode (memory map 0). This is the standard 32K BASIC machine. However, if you whisper the right bits to SAM, the BASIC ROMs will be turned off and 64K RAM is left (memory map 1). But, this RAM is useless without an operating system such as OS-9 or FLEX. If we want to use BASIC then we are confined to 32K RAM — or are we?

With memory map 0, SAM can perform a function known as page or bank selection. What this means is that either the lower half of the 64K RAM, ie, 0 to $7FFF can be assigned to BASIC or the upper half $8000 to $FFFF. With a small operating system which can perform bank selection, the two banks of memory can be easily accessed. Several utilities have recently appeared which make use of the two memory banks. However, these utilities use the upper bank for storage of programs which can be loaded to the lower bank or the reverse, programs in low memory saved to the upper bank.

While this type of utility serves a useful function, particularly for those without a disk system, *Key-264K* takes a different approach. It provides for both independent program operation in each bank either separately or simultaneously in a multi-tasking environment as well as complete interaction between both banks such as a program in one bank and the variables, subroutines, or extra graphics pages in the other bank.

Let's look at *Key-264K* and its operation. A simple *CLOADM* automatically loads the proram at the top of 32K in both banks, ie, about 29.5 K is left in either bank for programming. Once *Key-264K* is installed, it immediately does a cold start of both memory banks and adds 16 new commands, which are listed in Table I, to BASIC. In addition, several keys are used for each side to perform such

tasks as break, warm and cold restarts, toggle Extended and Disk BASIC, initiate multi-tasking, and duplicate one side to another. For example, the "down arrow" key serves as the control key for side A — the foreground side — while the right arrow serves as the control key for side B — the background side. Simultaneously pressing the "down arrow" and [ENTER] switches to side B. How do you know that you're in side B? The screen changes to the alternate text screen, the orange screen. Pressing the right arrow [ENTER] combination returns to side A with the original green screen. Both sides will show the Extended or Disk BASIC logos. But, in a disk system you can shut the Disk BASIC ROM off and revert back to Extended BASIC — so that you can load those "awful" machine language programs whose authors insist on loading in the same memory location which Disk BASIC uses for buffers and scratch pad — without removing the Disk controller pak.

It is impossible in the space available to this review to get completely into the details of all of the *Key-264K* commands. Hopefully, the reader will get a good feel of the capability of *Key-264K* by using the table of commands. I do want to emphasize that the *Key-264K* commands become a part of either Extended or Disk BASIC and the commands are used in BASIC programs like any other BASIC command, ie, no extra control keys, *PRINT* statements or whatever. In other words, the command *SWITCH* is just as much a valid BASIC command as *PRINT*. Of course, if you write a BASIC program using *Key-264K* commands, the program will produce SN errors if *Key-264K* is not resident in the machine.

As you can see from Table I, *Key-264K* provides a number of functions not possible in RS BASIC (why didn't they think of these). Let's take a look at a few of these commands. The PUSH and PULL commands are used to "communicate" between the two memory banks. They provide a mechanism for transferring data in the form of variables between the memory banks. For example, we could load a database program on side A and store the data on side B. When the data is needed for the program, the command PULL will bring data from side B to side A, e.g., PULL A$(25). After modifying the record we could then PUSH A$(25) back to side B. Of course A$ must be properly dimensioned on both sides. An alternative to using a memory bank for data storage is to use it for the storage of subroutines. To call a subroutine on side B from the main program on side A, the SWITCH statement is used. At the point in the main program where one would usually place a GOSUB statement, simply place a SWITCH statement, e.g., SWITCH 100. Execution of this statement would cause transfer to side B and begin execution of line 100. At the end of the subroutine instead of the usual RETURN statement another SWITCH statement with the approprite line number in side A would result in a switch back to side A.

Another very useful command is VIEW which has a number of options — too numerous to mention here. VIEW allows the user to place either the text or graphics screens of either side on the monitor. It is sort of a super *SCREEN* command in that it can be executed in direct mode to place a graphics screen on the monitor. For example, VIEWAG causes the graphics screen on side A to be placed on the monitor. To do this with *SCREEN* you would need the following code:

```
10 SCREEN 1,0
20 GOTO 20
```

As you can see, VIEW is a lot easier. To look at the graphics screen on side B, simply use VIEWBG. The VIEW

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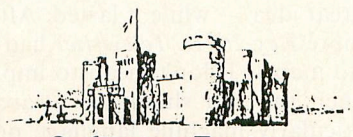

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command is not limited to graphics screens either. VIEWAT places the standard text screen of side A on the monitor while VIEWBT places the B side text screen. ith the VIEW command you can monitor what is happening on either side without switching sides.

The combination of VIEW with the two block memory move commands (MCOPY and CMCOPY) allows a programmer to use up to six graphics screens, e.g., the standard two on side A and storage of four additional screens on side B. The following brief code illustrates one approach:

```
 1 GOTO 10
 5 FOR I=1 TO 5000: NEXT: RETURN
10 VIEWAG: GOSUB 5
15 CMCOPYF 9728, 15871 TO 3584: GOSUB5
20 MCOPY 9728, 15871 TO 3584: GOSUB5 etc.
```

In this example we'll start by viewing the graphic screen on side A and moving blocks of memory which contain the graphics to the graphics screen on side A. Subroutine 5 is a standard pause subroutine. The CMCOPY command provides cross bank copying capability. In line 15 CMCOPY will copy a block of memory beginning at 9728 through 15871 from side B to side A and place it at 3584 which is the start of the standard graphics screen which VIEW is presently set to. To move the current graphics screen back to where we just copied from (side B), we could insert line 17:17 CMCOPYT 3584, 9727 TO 9728.

In line 20 we use the MCOPY command to move a graphics screen on the same side in which our program is running into the graphics screen which VIEW is set too. I'm sure most of you do not intend to move graphics screens around; however, this example serves as a good illustration of these two powerful block memory copy commands which serve a number of useful needs.

One of the major attractions to *Key-264K* is the capability to perform multi-tasking. To my knowledge, only OS-9 has this capability. So, just what is multi-tasking? Very simply, it is the ability of the computer to execute several programs at the same time. With *Key-264K* we can load a program into each memory bank and run them simultaneously. As an example, I loaded my favorite database program into side B, the background side, set up the report format and started printing my report. I then switched to side A, the foreground, entered the command MTON to initiate multi-tasking and loaded my favorite game. I must say, it as a strange feeling having full control of the computer which the printer chugged away. Now for this capability something has to give. Because CoCo must spend half its time with bank A and half with bank B, both the game and printer were noticeably slower. However, neither was slow enough to be a problem. At least I got something accomplished, if only playing a game, which I lost, while the printer was in operation.

To carry this process one step further, I decided to load my favorite word processor, *Telewriter,* into side B so that I could print a long document while working on something else. It was a great idea — while it lasted. After *Telewriter* loaded — no more *Key-264K. Telewriter* had reconfigured the computer to map 1. I don't mean to imply a defect in *Key-264K,* rather, the user should be aware that not all programs, particularly machine language programs, will run with *Key-264K,* ie, each program will have to be tested.

While *Key-264K* provides additional capability for BASIC proramming, it is also very useful for debugging BASIC programs. Using the [\] command you can test a small block of code in the background or with the LCOPY command send a copy of the program to the other side where you can test modifications without destroying the original which is on the other side. The LCOPY command has the same syntax as *LIST* and has the same options except that it "lists" BASIC lines to the opposite side.

With these few examples I have discussed and tabled, you should have reached the same conclusion that I have. *Key-264K* is an excellent utility which adds additional flexibility to BASIC programming. The program can best be described as an extension to BASIC. Just as most of you have added Extended and Disk BASIC to Color BASIC, so some of you may wish to add *Key-264-K.* I highly recommend it.

(Key Color Software, P.O. Box 360, Harvard, MA. 01451, tape $39.95, disk $44.95)

TABLE I
KEY-264K COMMANDS

COMMAND	FUNCTION
\	The backslash command is used to initiate tasks in the background in the multi-tasking mode from the foreground side.
CMCOPY	Copies the contents of a block of memory either to or from specified memory locations on the opposite side.
CPEEK	To return the contents of a memory location on the opposite side.
CPOKE	To change the contents of a memory location on the opposite side.
CRUN	To switch to the opposite side and place the opposite side in run mode.
DUP	To make an exact duplicate of the current side to the opposite side.
LCOPY	To copy one or more BASIC program lines from the current side to the opposite side.
MCOPY	To copy a block memory from one location to another on the same side.
MTON	To initiate the multi-tasking option.
MTPAUSE	To provide a temporary halt to multi-tasking.
PULL	To copy a variable from the opposite side to the current side.
PUSH	To copy a variable from the current side to the opposite side.
SCOLOR	To switch the text screen solor.
SWITCH	To switch to the opposite side.
VIEW	To display text or graphics screens of either side from either side.
WAIT	To provide a pause in foreground processing until the background job ends or requests keyboard input.

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RubiconII — Patton Would Have Loved It

I have been a games player for many years. I play everything from chess to poker and blackjack, and all types of war games from board games to miniatures. I also have learned to love the Color Computer for all of the great graphics possibilities and the use of one of the best BASICs available. The one thing that the Apple and the Atari have had over us is the availability of true, full-featured war games. We have come of age with *RubiconII*. At last we have a game which will actually give the feel of a real battle situation.

What do I mean by the feel of a real battle situation? A really good war game will give you some of the fear of war. You get to see some things about people that you may or may not wish to know. Many people think that it is not possible to simulate the war in a game because nobody can get hurt. If the game is good, this is not true. I played in a war game tournament several months ago at West Point Military Academy. I was on the "US" team playing against the "Russian" team. In most such games of modern warfare, the object is for the "US" team to defend and have all of the massive "Russian" team jump on them and try to dislodge the "US" material. You get to learn what Custer must have felt like. Knowing a little about one of the "Russian" players, I told the "US" team during the pre-game briefing a little of how the actual Russian battle plan works. A few fast moving units go rapidly through town trying to draw fire. If they do, the massive Russian tanks sit off and blow the buildings away. The way to fight this is you must sit hidden and let the first units go through. Then you destroy the tanks at close range when they advance.

The way it actually happened was our right flank commander saw all the "Russians" in the world coming down on him. He panicked and fired at long range at a few motorcycles and armored cars. When the smoke cleared, the town and our right flank were no more.

The game *RubiconII* has all of the feel of this. In *RubiconII,* you play the American side and the computer plays the German side. You must cross the Rubicon (the Rhine?) and destroy several German cities and an airfield. The Germans are outnumbered and have several of their units under strength. The German side, however, is hidden and you are not. The American side must cross the river, advance against hidden forces, and maintain supply lines.

The game is played as a board game in Lo-Res because of the memory requirements. There is, however, a very good and clear map that is used. I have played the 16K version of this game and find this one much more effective. The unit types are indicated by logical letters indicating their type. The computer does all of the bookkeeping for you, telling the number of the unit, the strength, and the supply factor. This is excellent.

Many World War II unit types are used in this game. You have infantry units (some with mortars), heavy tank, tactical air, recon tank, artillery, and supply units. Don't forget these last (as I did). If your units go out of supply they cannot move and are quickly lost. One of my losses in this game came because I failed to protect my supply units. It also is possible to have parachute drops of units into the battle. For the sake of several of my units, I wish I could also have dropped supplies. Artillery is rather powerful in this game — possibly a little more powerful than in actual World War II action. But one good (and frustrating) feature is that you do not have the use of artillery any time you want it. As in actual battle situations, it is possible for the artillery to be involved in supporting other battles and not be available to you when needed.

The other side of the coin to panic in a real war game situation is the "blood lust" — the old "damn the torpedos, full speed ahead." Many great acts of heroism and stupidity in war (the difference between these depending on the result, not the relative bravery) is due to this. During *RubiconII* this feeling may come at the wrong time. In the game where I did not protect my supply lines, I was rampant to kill the evil foe and do it *now*. One hidden enemy unit was bypassed and came to light behind my lines to destroy my supply unit. Then came the "panic" I mentioned before, as my units were cut to pieces while out of supply.

A true war situation combines the need for both tactics and strategy. I might define the way I use these words. Strategy is the combination of everything that is done before each battle to get your side ready for the battle. Tactics is the actual conduct of the units during the actual battle. *Rubi-*

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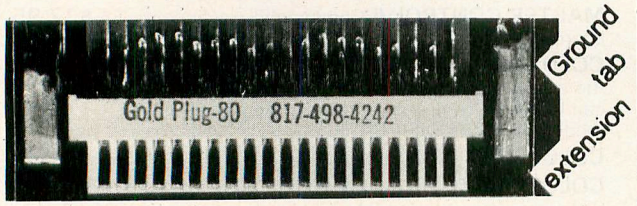

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conII has both of these aspects well employed. The tactical problems are clear cut and the success of your separate battles involves the movement and placement of pieces. Your strategic problems include the need to supply units, the use of reserves, and the object of the game itself. Remember to read the rules. Your object is not to destroy as much of the enemy as possible. You have specific strategic objectives in this game and your victory score depends on how well you achieve these goals.

The documentation of *RubiconII* is much better than average. It consists of an eight-page booklet and is done on a reasonable printer. As with most good games, the rules are a little complicated, so read carefully. As I have already stated, if you want to win, look at the victory conditions.

In warfare, one of the basic principles is to bring maximum force to one point of conflict in order to gain an advantage over the enemy. This is one feature that is often missed by war game designers, especially computer war game designers. If one unit must always face one unit and the other units are not figured into the action, the use of the greater force against one point in the enemy line is not felt. I consider it a significant flaw if two or three units cannot jump on one enemy unit. Although you may miss the feature in *RubiconII* at first glance, this flaw is avoided in a rather subtle and clever fashion. When units are "full strength" and able to take care of themselves, they fight one-on-one. When several of your units become "understrength," you can move them to one location and join them with the *MERGE* command. Although this is not a "perfect" solution, it is a very good one and one that does not take much memory away from the game.

Another nice feature of the game is the possibility to save games during the play. This will allow you to continue the game later or to try several solutions to a given situation. The game takes about three and a half hours to play.

I have a few suggestions to make for the faster play of the game. If your computer will take the high speed poke, add *POKE65495,0* to the first line. You must also add: *POKE 65494,0* to line 4780 to slow the computer down for the *SAVE* feature.

The cassette and the disk version are both on the tape. If you have the disk version, save to disk and make the two above changes. Then make and save the following program (I called it *STARTER: 110 POKE25,14: POKE3584,0: RUN"RUBII."* This makes the proper *CLEAR0* for disk and allows a quick startup with just *RUN"STARTER."*

There are now several ways to get 64K from the CoCo, both using the upper RAM for data in BASIC and from OS-9. One of the reasons for more good war games with the Apple and Atari are the use of 48K. I would expect the future to bring even better war games for the CoCo. For the present, *RubiconII* is one of the best — if not *the* best — war games available for my machine.

If you think I liked this game, you are right. The game is by Ark Royal Games. A friend of mine has corresponded with them about one of their previous games and has found their customer relations excellent. I suggest you get this game and go to war against CoCo. At the low levels I can win; at the highest levels, Patton might not be able to.

(Ark Royal Games, P.O. Box 14806, Jacksonville, FL 32238, 32K ECB, tape $24.95 [loadable to disk], disk $27.95)

— Tom Roginski, Ph.D

Face Maker 'Speaks' To The Young

Face is a family game with a simple but entertaining format. It talks! After you have loaded and executed the program, a man's face is screened, along with the words "eyes," "ears," "nose," "mouth," and "hair." A red cursor passes each word. If you press any key (including [BREAK]) when the cursor is opposite "nose," for example, you hear a computerized voice say "nose" and get a menu of different noses. Selecting one of these shows the face with its new nose. This simple keyboard response makes the program suitable for toddlers and handicapped youngsters.

My two children, ages six and three, enjoyed the game and the novelty of hearing our CoCo speak. I felt it was a lot of code (12K) for five words, code that might have been used for more features. The kids agreed. One son wanted to change the style and color of the bow tie under the face; the other thought "no hair" should be a choice. All the features (except for the bow tie) are red. Better use could be made of color—the eyes could have been blue or green, for example.

Still, we had a lot of fun "making faces." I'm a former psychologist and family counselor, and I found that *Face* lends itself beautifully to parent-child interaction. Sit your youngster(s) on your lap and invent your own games. Here are some of our favorites:

- Observation skills: "Close your eyes while I push a key. Okay, look—what did I change?"
- Sharing opinions: "Which one do you think is funniest?"
- Sharing feelings: "Can we make him look happy? Sad? Angry? Surprised? (How can you tell people's feelings from the way they look?)"
- Cooperation: "Let's take turns. But I get to do the eyes!" (this one from my six-year-old)
- Exploration: "If I could do it fast enough, could I make him blink his eyes?"

The program is aimed at youngsters ages one to five years old.

The packaging is simple but adequate. I liked that because it helps keep the price down. The documentation is also simple, the kind of step-by-step instructions that all software should have. Both saves loaded on the first try.

Since my computer is on loan once a week to the special education class at the high school where I teach, I had the group take a look at *Face*. Even these teen-aged videogame sophisticates were amused. One girl made this assessment: "My little brother would love this!"

You know, I'll bet he would.

(Childish Software, P.O. Box 985, Norcross, GA 30071, 16K tape $21.95)

—T. Gray

Spelling Is D-e-l-i-c-i-o-u-s With *Cookie Monster's Letter Crunch*

Big Bird, Oscar the Grouch, Cookie Monster; what do all these names have in common? Stumped? Ask any little child, or maybe not so little, and you will find out that these are the names of characters on a very popular educational TV series called "Sesame Street."

"Children's Computer Workshop," an activity of "Children's Television Workshop," which presents "Sesame Street," has again demonstrated its expertise in children's education by introducing a series of learning programs for the CoCo!

One of these programs is entitled *Cookie Monster's Letter Crunch*. The 16-page documentation that accompanies this 16K ECB cassette program is excellent. It begins by instructing you how to set up your computer, and successfully load in the program. This part may seem "old hat" to some of you, but this just demonstrates the care that was taken in writing the manual. The object of these games, or I should say eductional activities, is to match up letters or words. By doing this correctly, you proceed to bake the letter or word in an oven that transforms it into Cookie Monster's favorite food . . . *cookies*, of course!

After a well-done graphics screen is displayed, the first menu appears. On this menu you have four main activities to choose from. After you choose, the next screen offers you the choice of using a predetermined word list or the option to create your own. The next menu is the skill level at which you wish to play. There are six levels of increasing difficulty. Choosing a level above two will display words instead of letters in the oven. The four main selections include a matching activity, a matching and memory activity, a timed matching game, and a timed memory and match game. Pressing the [CLEAR] key at any time will end the present activity and return you to the main menu.

It is recommended that you start with the first one, "EASY BAKE," the matching activity, and at the first level of difficulty. The object of this activity is to match the letter that appears in the baking oven at the top of the screen, to the correct letter appearing on the bottom of the screen. You do this by means of the joystick. By moving the joystick left or right, you will also be moving the Cookie Monster. You must move him over the letter that you think matches the letter that is in the oven. After you make your selection, press the joystick button. If you are correct the letter drops down into a tube that carries the letter to the oven for baking. As it bakes, the Cookie Monster rushes over to the oven, jumping up and down in anticipation, waiting for his reward. After a brief moment, a cookie drops down from the oven into the eagerly waiting hands of the Cookie Monster. He then hastily eats the cookie. A wrong answer simply returns a tone and then proceeds to give you another try.

The next activity is "BAKE AWAY," which is essentially the same as "EASY BAKE" except that the letter or word that appears in the oven for you to match only stays visible for a brief moment before it disappears. You have to remember what was in the oven; however, pressing the spacebar will allow the letter or word to be displayed again.

"CHIP CHASE," the third activity, again is essentially the same as the others, except that the letters, which appear on the bottom of the screen under the Cookie Monster, are now moving around. You have to be quick to match the correct letter. A timer is also added in to pace this activity.

The last entry is entitled "CHIPS AWAY." This activity is similar to CHIP CHASE; however, this time you really have to keep your eyes open. The letter or word in the oven—the one you have to match—will disappear as in "BAKE AWAY," but the letters below Cookie Monster are moving around, too. Add back the timer, and you really have to keep on your toes.

Throughout the documentation there are numerous suggested guidelines that will assist you in getting the most benefits from these programs. Also included, in the last pages, are suggested activities you can play with this series of programs. After introducting this program to my children, ages 6, 5, 3 and 1, I have found it very difficult to try to turn on the TV without hearing a request to play "The Cookie Monster Game." Knowing the reputation that the Children's Television Workshop has attained, I would not hesitate to recommend this program to those who have small children in their home. At $19.95, it's a real bargain.

(Radio Shack Stores nationwide, tape $19.95)

—Theodore Hasenstaub

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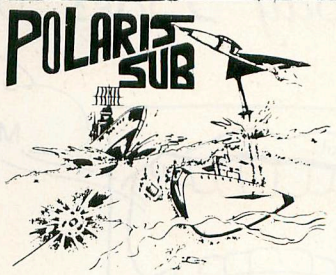

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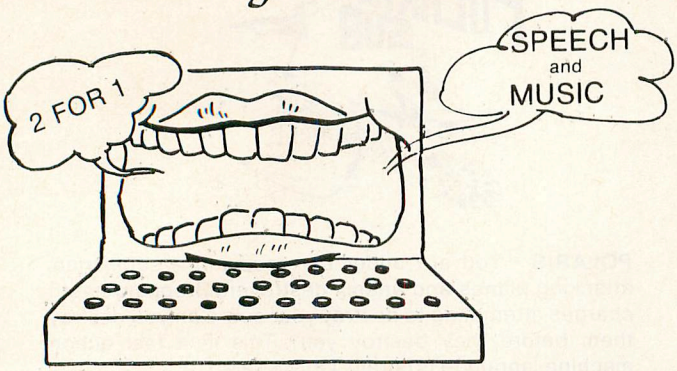

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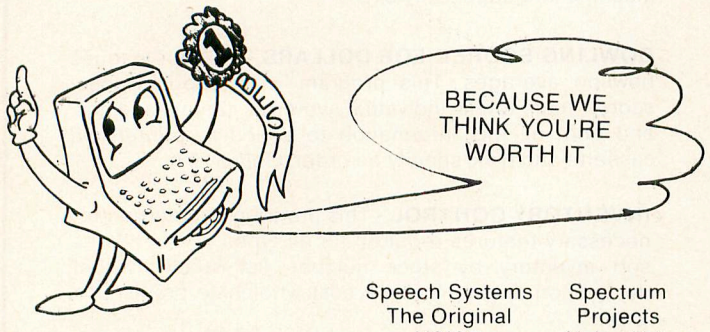
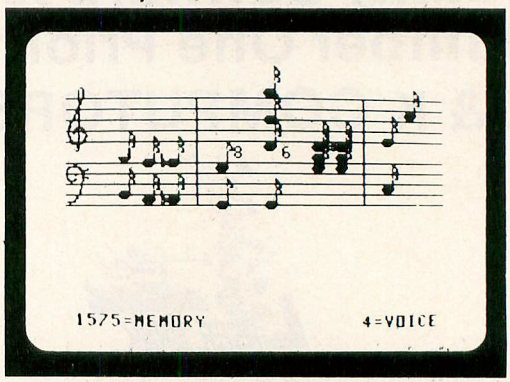


	Speech Systems The Original VOICE	Spectrum Projects Voice-Pak
Speech thru TV speaker	Yes	Yes
Speech thru external speaker	Yes	No
Volume control	Yes	No
Pitch control	Outside Adjust	Inside Adjust
Demo Programs	5	None
Phoneme Editor	Yes	No
Text-to-Speech program	Yes	Yes
Documentation	40 pages	9 pages
Software	2 tapes	1 tape
IC count	6	2
Case material	Aluminum	Plastic
Case size	15/16 x 5½ x 4¼	15/16 x 3 x 4¼
CoCo 2 version	Coming Soon	No
Expansion Unit Compatibility		
RS Multi-pak	Yes	Yes
BT-1000	Yes	No
Spectrum Switcher	Yes	No
Y-Pak	Yes	No
Y-Cable	Yes	No

NOTE: All software (except Termtalk) will work on either unit, so you can buy our software and their hardware or vice versa.



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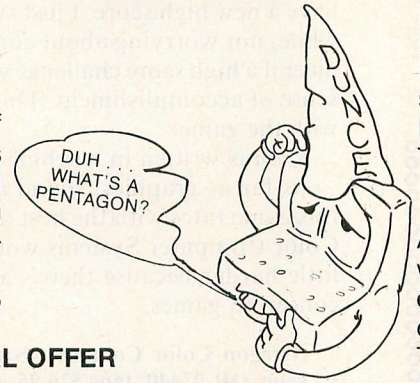

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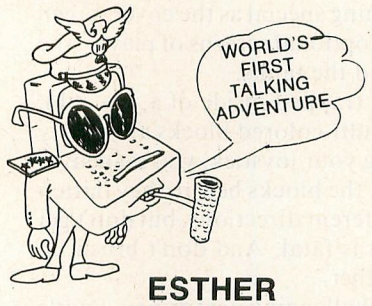

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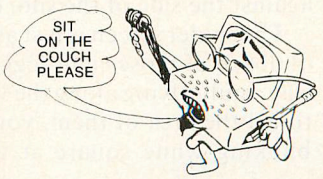

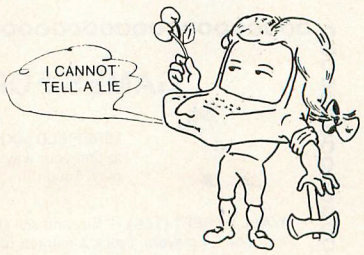

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Well-Conceived *Kron* 'Rates With The Best'

If you enjoyed the Walt Disney production of "Tron" and you have played the arcade version of the same movie, you will undoubtedly appreciate *Kron*, a new rapid-paced, high resolution game by Oregon Color Computer Products.

You recall that in the movie, our hero becomes trapped inside of a computer game, and for the next hour or so, he is challenged by every conceivable video game effect as he tries to make it back to the real world.

You know you have something special as the cover screen is unveiled, allowing you four optional screens of play — the silo, the spiders, the cycles and the tanks.

On the silo screen, you are trapped inside of a, yes, silo. High above, three levels of multi-colored blocks are slowly descending toward you. Using your joystick, you maneuver our hero into position to blast the blocks before they flatten him. You may aim in three different directions, but don't get too close because their touch is fatal. And don't brush up against the side of the silo, either.

The spider screen is just as challenging, featuring a couple of dozen of those eight-legged insects who are inching your way, multiplying along the way. If you are fortunate enough to rid the area of them, you must make your way into the blinking white square at the top of the screen. Careful, though, because the entrance is small and you must plan your move carefully.

Your entrance onto the cycles screen is preceded by realistic revving sounds. You've seen this screen before if you have typed in *the Rainbow's* listings faithfully during the past couple of years. It consists of moving lines — yours and the computer's. You must outlast the computer in order to survive. Although this screen is simply conceived, it also is one of the more difficult.

If you survived this far, you're ready for the tank battle. Your tank is pitted against one driven by the computer. You must travel through a maze attempting to blow up the enemy. Careful, though, your bullets can bounce off of walls and you can shoot yourself. This allows you to shoot around corners, which in itself is fun. Head-on confrontations can be dangerous because the enemy's fire power obviously is stronger than yours. This is a fun screen and I've seen entire games devised around the concept.

A free turn is received for every 10,000 points. When an enemy is defeated, the screen does not reappear until the rest of the enemies have been conquered. After you've survived four screens, the screen select symbols reappear and the level of difficulty increases.

A pause feature is activated by pressing any key during the symbol-select phase. You may resume play the same way.

I found the high score feature a little annoying at first because, for at least your first five times through, you will have a new high score. I just started pushing buttons after a while, not worrying about correct initials. It would be a lot nicer if a high score challenge were built in — to heighten the sense of accomplishment. This really was my only problem with the game.

Kron is written in machine language and requires 32K.

As far as graphics, sound and challenge are concerned, this game rates with the best of them. My advice to Oregon Color Computer Systems would be to promote this gem a little harder because there's a good market for such well-conceived games.

(Oregon Color Computer Systems, P.O. Box 11468, Eugene, OR 97440, tape $26.95, disk $29.95)

—Charles Springer

GAMES FOR THINKERS

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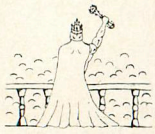
WALL STREET (16K) — Buy and sell stocks to make your fortune! 1-4 players. Stock & market, history charts. Many extras! Good family fun! *G12 — 12.71*



BABYLON (16K) — Govern the ancient city of Babylon. Manage the City's assets and military to contend with enemy invasion, poor crops, plague, and other disasters. 10 levels of play! Tournament scoring! *G13 — 12.50*

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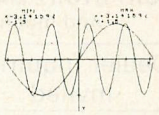

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KEYNOTE: Bob Albrecht

Advance Ticket Deadline: Feb. 13, 1984

★ ★ ★

RAINBOWfest — New Brunswick, N.J.
DATES: March 30 — April 1
HOTEL: Hyatt Regency, New Brunswick
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KEYNOTE: To Be Announced

Advance Ticket Deadline: March 23, 1984

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Gorilla Banana GX-100 Printer: Both A Beauty And A Beast

By Ed Ellers

Why anybody would want to call a printer a "Gorilla Banana" is beyond me. Leading Edge Products, which distributes the Banana in this country, also markets a Gorilla 12" green-screen monitor and Elephant diskettes; they must like animal names (which makes me wonder what they would do if they introduced a personal computer). Once you get past the distinctive (to say the least) name, you'll find that the Gorilla Banana is a very economical printer for the CoCo.

The one thing that hinders the use of the Banana with the Color Computer and the MC-10 is its use of a Centronics-type *parallel* interface. To get it hooked up to the CoCo's *serial* I/O jack (where the printer is normally connected), you must use a serial-to-parallel interface unit. A number of these are available; I used a Botek Instruments CCP-1, which Spectrum Projects sells for the Banana. The CCP-1's instruction sheet tells you how to change the CoCo's "Baud rate" (the rate at which it sends characters to the printer) to a number of values ranging up to 9600 Baud (16 times as fast as the CoCo's normal 600 Baud and approaching the speed of a parallel interface). You then set the Botek's selector switch to match whatever rate you chose. (As supplied by Spectrum, the CCP-1 takes its power from the printer and does not have to be plugged into an AC outlet. If you purchase directly from Botek, the interface comes with an AC adapter which you may remove, if desired. Instructions are provided.)

The printer I received for review was *not* labeled "Gorilla Banana." It was identified simply as the "GX-100" both on the unit and in the manual. The only clue to its source was that it was labeled on the rear panel as the Leading Edge Products GX-100. I've seen this printer in local stores as well, so I think that Leading Edge was shipping the GX-100's while waiting for their customized Gorilla Banana units to come through. The printers are identical except for the color of the case; the top half of the GX-100's case is an off-white that matches the newer "fawn gray" CoCos (the bottom is dark brown) while the Gorilla Banana is dark green.

The Gorilla was originally assigned for review to a *Rainbow* staff member who is a newcomer to computers. She got the printer hooked up to her home CoCo quickly, put in the ribbon, set up the tractors and inserted some paper. The first line she printed turned out fine; but when she tried to print another line, it ended up right on top of the first. (Editor's Note: This unsettling experience happens to many CoCo owners with printers of various brands when they first try them out. The problem relates to the CoCo's use of serial I/O since printers are usually set at the factory for use with some other computers. It is not a defect. Read on.) She frantically looked through the manual to find out what was wrong, but could find no answer other than that the paper might have jammed (which it hadn't). Fearing that she had either damaged the printer or that she might wreck it trying to get it going, she brought the Gorilla back to the office; I was then assigned to review it.

When I hooked it up, I got exactly the same results that she did. At first I thought that the printer was defective; then I went through the manual looking for the switch setting instructions. On Page 11, I found the following:

> "The Printer has a Printed Circuit Board (PCB) on which a dip switch is located. With turning No. 3 of the dip switch ON or OFF, the meaning of CR (0D) can be changed to either NL (0A) or DC4 (14) respectively. The dip switch is at the top center of the PCB . . . and it can be seen from the back of the printer after removing the five screws and the upper case. NOTE: Four switches are set to the "OFF" side when shipped from the factory."

From my electronics experience, I knew what a DIP switch was, and I knew that the CoCo expects the printer to automatically advance the paper after each line (it sends a carriage return but not a line feed), so I was able to set the Gorilla to match the CoCo's "protocol" (the set of control codes it uses). Since the manual is of little help in this situation, I'll give the procedure here: *Before you plug the printer into an outlet,* remove the top half of the case (three screws are under the front edge, and the other two are on the back of the unit). The DIP switch is actually four tiny white slide switches in a black housing on the circuit board, and the switches are marked 1 through 4. Flip switch 3 *on* (up) and make sure that the other three switches are *off* (down), then put the top back on.

The manual is the only thing I dislike about the Gorilla Banana, because it's apparently written for an engineer to use when designing a system that is to use the printer. It gives you all the little details about signal levels and timing (you are told for example that "Bringing the TEST* line 'LOW' starts the self-test printing which continues until it is returned 'HIGH'."), but falls flat on its face when it comes to explaining how to make the printer work with your computer. (Leading Edge told me that they have not rewritten the manual; I think that they would do well to consider it.)

The Banana's print quality is quite good, even though it uses a rather small (5 x 7) dot matrix rather than the 7 x 9 used by many printers. Here's what it looks like:

```
 This is what the Gorilla Banana's
printing looks like.  As you can
see, there are NO descenders on any
letters, so such things as "j", "p"
and "q" stick up above the rest of
the text a bit.
```

This print quality is good enough for casual correspondence (although you might not want to use it to write to your uncle in Peoria who hates computers), as well as school work and even writing articles (most publications, including *the Rainbow,* will accept such typing).

The Gorilla Banana also has high resolution "bit-image" graphics capability, which lets you print individual dots in any pattern you can program. Using a special driver program (like Custom Software Engineering's GSPRB), you can print out copies of the CoCo's Hi-Res graphics. The pictures are of good quality, although the density of the dots is slightly uneven (though not any more than I've seen in

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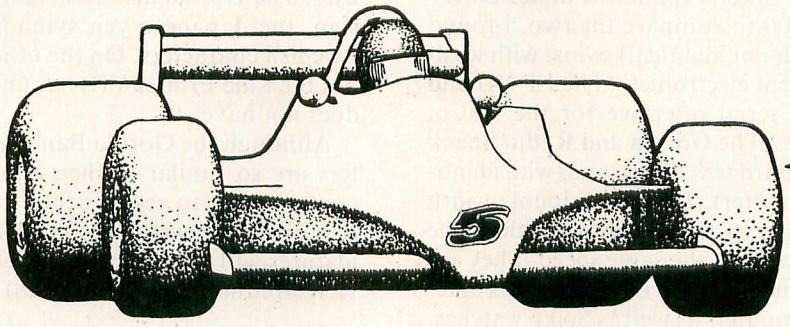

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The finish line flashes by, and suddenly you are in the pits. The car falls silent. You see your lap times being held up. Your final lap was a new lap record! At last, you permit yourself a small smile.

You have mastered this powerful car on a difficult track, driving with the assurance and precision that comes only from long hours of practice.

You are driving an *authentic* race car. You are playing *Revolution!*

FANTASTIC ACTION

Revolution uses high resolution, machine language graphics for action that is smooth and fast. The emphasis is on authenticity in the control and motion of your car. As in driving a real race car, accuracy and precision in your driving are what counts. Frills and non-essentials have been left out.

PURE COMPETITION

Like a real race driver in practice and qualifying sessions, you compete against the clock and against the existing lap record for that track. *Revolution* records the lap records and the name of the person who set the record, so you always know who reigns supreme on your favorite track!

DESIGNED WITH YOU IN MIND

Revolution is menu-driven, and self explanatory. Information screens tell you what you need to know. When you're ready to play, a menu of the names of all your tracks is displayed, along with the lap record for each track and the name of the person who set that lap record. You select a track with a single keystroke, and *Revolution* takes you there.

A NEW CONCEPT

Revolution is a unique game, because it allows you to create the most important part of any race game: the track itself.

The first time you run *Revolution,* you will be able to choose from several tracks and cars which are included with the game.

But, with *Revolution,* this is only the beginning! You can create as many tracks as you like. You can make each new track as difficult or as easy as you wish. You can make easy ones to begin with, and tougher ones as you become more skilled. You may find creating tracks to be almost as much fun as driving on them!

You can save your favorite tracks to run on again whenever you wish. *Revolution* will automatically add these new tracks to the menu. And you can exchange your favorite tracks with other *Revolution* owners.

Be careful, though, about letting your friends play this game. They may not want to let you have your computer back!

THE EARLY *REVOLUTION*

A prototype version of *Revolution* was published in the September, 1982 issue of Rainbow magazine, under the name *The Track.* The response to *The Track* has been terrific.

Revolution has all the features that have made *The Track* a favorite, and *Revolution*'s fast, high-resolution machine language graphics are dramatically improved over the prototype's.

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The original *Revolution* for the TRS-80™ Color Computer requires 32K and one disk drive. A new cassette version has action just like the disk version, and similar track-saving features excluding a menu of available tracks. The cassette version will run on a 32K Color Computer or TDP-100. You can upgrade to the disk version later, too, for a nominal fee.

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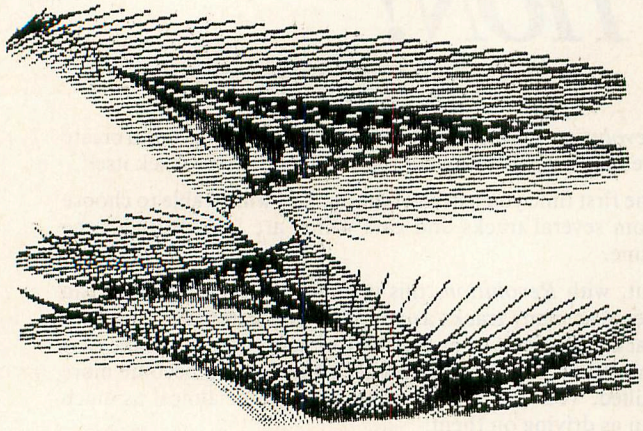
other printers).

Since the Gorilla Banana is touted as being almost identical to Radio Shack's Line Printer VII and the newer DMP-100, I borrowed a DMP-100 to compare the two. I found them to be fraternal (though not identical) twins, with identical mechanisms but different electronics. (The LP VII and DMP-100 have a built-in serial interface for the CoCo, which explains that change.) The Gorilla and Radio Shack printers have the same standard text characters (with identical patterns for every character), the same double-width mode and the same graphics characters. They use the same ribbon (R/S 26-1424) and print at the same speed. They are both made by Seikosha, whose sister companies manufacture Epson printers and computers as well as Seiko watches.



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Now for the differences. First, the Gorilla Banana's case is heavier and more durable than the case that Radio Shack uses. The Gorilla also has characters for the British pound sign, the Japanese yen symbol and special German and Swedish characters. On the other hand, the DMP-100 (but not the Line Printer VII) has underlining, which the Gorilla does not have.

Although the Gorilla Banana and the Radio Shack printers are so similar in their capabilities, they use different control codes to activate their various features! This means that programs written to use the LP VII/DMP-100 special features will have to be modified to work with the Banana. Here are the codes (in decimal) that have been changed:

Function	Radio Shack	Gorilla Banana
Graphics mode on	18	8
Repeat pattern	28 22	19
Normal text	30	15
Double width text	31	14
Underline on	15 (DMP-100)	none
Underline off	14 (DMP-100)	none

One other note for those of you with older 4K or 16K CoCos: The old 1.0 version of Color BASIC (if you have 16K RAM and Extended Color BASIC, type *EXEC* 41175 to find out if you have it) uses a 7-bit printer output format, rather than the 8-bit format used by newer machines (including all TDP System 100 and Color Computer 2 units). To use the Gorilla with the Botek CCP-1 interface on such a computer, you will have to either change the jumper wire in the CCP-1 to the 7-bit position (which means that you will not be able to use graphics) or use a driver program for all printing including text. (Radio Shack had this driver available by special order as 700-2013, but they may have discontinued it.) Since you will need to change to a newer ROM if you ever decide to upgrade to 64K, you may want to go ahead and do it now, avoiding all that "patchwork" in the process. (The Color BASIC 1.2 chip runs BASIC programs about 30 percent faster than the 1.0 and 1.1 versions.)

The Gorilla Banana GX-100 printer and Botek's CCP-1 interface give you a real 80-column tractor-feed printer for about $100 less than Radio Shack's DMP-100. I recommend them to anyone who wants to get a good printer for as little cash as possible.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421; printer $249.95 + $3 S/H, interface $49.95 with printer purchase. The interface is also available from Botek Instruments, 4949 Hampshire, Utica, MI 48087, $69)

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Fowl Play Is Fair Game

I was coming home from my local arcade still excited over my new victories, but, as usual, I was broke. Flipping open my mailbox, inside I found Thunder Vision's new arcade program *Jowst*. I rushed upstairs and nervously loaded it. As I waited for the 16K, 100 percent machine language program to load, I quickly scanned the sheet of instructions. I could feel the arcade action pulsating through my fingers as I slowly typed in *EXEC*. There it was, the flamboyant title screen that I had just left in the arcade, now on my TV screen. The title screen not only displays high score and the modes of play, but it has a sparkling border and *JOWST* written in flashing letters. I selected the one player mode and that is when all the arcade excitement left me. I was in control of a dangerous duck-fighting cantankerous chickens. This just-like-the-arcade program turned out to be a mediocre facsimile.

The documentation is typed on a small sheet of paper with a fancy header. The documentation tells you the object of the game, the three modes of play and gives some general hints. The documentation is vague and it assumes that you have a general knowledge of the arcade game Joust. The instructions give enough information to load and play the game, but they leave much to be desired.

The object of the game is to destroy enemy chickens by striking them from above with your duck. One controls his duck entirely through the keyboard and this is one of the program's major faults. The keyboard control is erratic and it distracts from the overall game play. The real problem starts when a two-player mode is selected and two people have to use the keyboard at the same time. Joystick control would have solved this problem and it would have made game play much smoother.

Jowst has three modes of play. They are one-player, two-player and head-to-head. Head-to-head combat is one of the best features of this program. This mode allows two players to *Jowst* it out with no computer-controlled chickens. More games should have a head-to-head option like the one included in this program.

The graphics are probably not what one would see in the arcade, but they are still good. The ducks' and chickens' wings flap as they gracefully move across the screen. After you hit a chicken from above, it turns into an egg that slowly sinks to a platform. The eggs change colors just before they hatch so you know just about how much time you have before the egg hatches into another chicken. Even though the graphics are good, I still lost interest in the program after playing it a few times.

The sound, on the other hand, is definitely not what one would hear in the arcade. It's nothing more than a few beeps and buzzes. There is no difference in sound when you get killed or when you kill a chicken, so it is sometimes hard to figure out what happened. The author blames the poor sound on a concentrated effort to make this game work on 16K computers so that it would not be necessary to purchase any expensive upgrade kits. I find this very strange since you could upgrade to 32K for less than the price of *Jowst*.

This game is fair, but it obviously does not "play just like the arcade." In my opinion, if you have 16K this program might be worth looking into, but if you have 32K I suggest that you select one of the 32K Joust-like programs.

(Thunder Vision, P.O. Box 3241, Grand Junction, CO 81502, 16K cassette, $28.95)

—Steven Schweitzer

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Be sure to tell about your Adventure, including how to win it; it may have us stumped. Point out the salient features of your creation and comment on any aspects that deserve the judges' attention. Put any accompanying article, cover letter or documentation *on paper* and put *the program itself on tape or disk*. This is a must; we will not type in even the shortest of entries. Lastly, put your name on everything and be sure and write-protect your disk or punch out the tabs on your cassette so nothing gets accidentally erased.

Above all, get it in by May 1, 1984, in bug-free condition complete with any necessary instructions. Keep following *the Rainbow* for more details and a complete list of prizes, but remember there'll be something for everybody — for example, every entrant will receive a free pass to the RAINBOWfest of his or her choice!

RULES: All programs must be original works, no "conversions." Entries must be postmarked by May 1, 1984, and become the property of Falsoft, Inc., publisher of *the Rainbow*. Decision of the judges is final. Duplicate prizes will be awarded in the case of ties. Winning programs to be featured in a special *Rainbow* Adventure issue. Mark entries "Adventure Contest Editor" and send to *the Rainbow*, P.O. Box 209, Prospect, KY 40059.

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What Will Your Social Security Benefits Be?

Parsons Software's *FICA-83* programs will really tell you, clearly and accurately, how much you will get when you reach that magic age, and give it to you in hard copy if you want to.

I had been out of town on a long weekend, arriving back home about 6 p.m. When I went through my mail I found a FICA-83 for review. I usually put the cassette into the recorder, put the program into the computer and attempt to run the program "by the seat of my pants," but, being tired from driving, I decided to read the instructions and then look at the program the next day.

In only minutes of reading the instructions, I realized that this was not the work of an amateur, but of a professional. In my experience, fully 50 percent of all software instructions are poorly done by people who have never had the advantage of the English teacher who insisted upon "unity, coherence and emphasis." Parsons Software instructions for the use of the FICA-83 programs, however, would receive high marks from my English composition teachers. They are clear, concise and complete. They also tell you that the programs are disk compatible, and they are. After reading the instructions I could not wait to try the programs.

After putting the programs into my CoCo and telling CoCo to *RUN*, I realized that, as good as the instructions were, they were really not necessary. The programs are straightforward and fully self-explanatory; asking all the right questions and responding immediately to the answers.

There are two programs on the cassette, one (*FICA-83s*) for a quick determination of your Social Security cash entitlements and printing the results to the screen, and the other program (*FICA-93P*) prints out a complete summary of your Social Security benefits using the personal data which you have entered by answering the clear questions asked by the program. These programs need no long study or trial and error, but will give you what you are looking for, and in a hurry! Both programs have incorporated the latest changes in Social Security law and provisions for those who continue working after retirement age.

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In summary, these programs do just what the instructions say they will do and with a minimum of effort on the part of the operator. They are truly "user friendly." Congratulations to Parsons Software!

(Parsons Software, 118 Woodshire Dr., Parkersburg, WV 26101, tape $19.95)

—Charles L. Redman, Jr.

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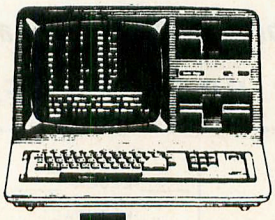

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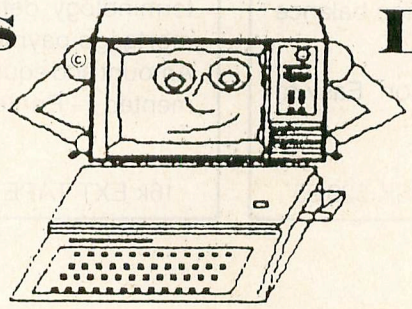

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Problems?

No, Just Pre-Solved Situations

By D. S. Lewandowski

This month we will discuss a topic no one seems to want to talk about. That topic is "problems." How they are made, and avoided. First, I would like you to take the correct approach in problem solving. Keep a pad of paper, or better yet, a notebook, handy. This way, if you encounter a problem, you can write down a specific question, and leave enough space for an answer. This way, you will only have to solve that problem once. There are a couple of different methods to solve each problem. One of the best is a Computer Club. See if someone else in the group has already encountered your problem—why reinvent the wheel? The second is asking the manufacturer. This method requires "careful" documentation. Don't expect an instant answer, most of the time the manufacturer must check with many people to see who has encountered it, and why! To solve a problem without documentation is completely impossible. Don't rely on your memory, you'll end up using phrases such as "I think . . .," "I'm pretty sure . . .," and so on. *Use* your pad or notebook, to your best advantage.

Let's get some terms straight before we continue. The term "source code" refers to the text we type into the editor. It is saved to tape using the "W" command. (Example: W TEST would save a source code file to tape using the name TEST.) The source code can only be loaded into the editor, and allows you to edit the file easily, and you can save a lot of retyping if saved prior to testing the program. Then we have "object code," which refers to the actual machine language program. It can be loaded into the computer with the *EDTASM+* cartridge. And depending on the program, it can operate independently. (Example: A test would save an object code file to tape using the name test.) Finally, we have a "ML LISTING"; this is a listing of the actual byte code of the program, and is usually in hexidecimal. This listing could be put in with a monitor program such as *ZBUG*.

The reason I mention these terms is due to the first question many people ask. "What do I type in?" Most assembly listings you find in the magazines are either source code, or a combination a of source code and ML listings. In all cases, just remember that the source code starts with the label field. In inputting text into the editor, always start with the label.

(Dennis Lewandowski, one of the early authors active with the Color Computer, specializes in machine language programming. He and his wife, Rose, founded DSL Computer Products.)

The following problems, and solutions, are based on the *EDTASM+* cartridge sold by Radio Shack. These seem to be the most often encountered, and frustrating, problems for beginners and old hands alike. The most misunderstood command in assembly language is ORG, which is short for ORIGINATE. This should be the first command in the text. It tells the editor/assembler where the program is to begin in the computer's memory. If you assemble the program using *ZBUG* with the AO (Absolute Origin), and the program conflicts with any of the memory *ZBUG* is using you will get "BAD MEMORY" errors. There are two ways around this, first don't use the AO option. Second, assemble the program to tape, and reload it without the *EDTASM+* cartridge. Always save your source code prior to powering down your computer!

The error "bad label" can be generated many different ways. The most popular is entering text in which the author uses a label like "A@." Although the @, or ampersand symbol, is not a reserved character in *EDTASM+*, it just doesn't like it. So don't use it. Instead, substitute another A. (Example: A@ use AA if you encounter another A@ later in the listing, which is legal in MICRO-WORKS SDS80C, use another letter like AB.) The other common mistake, which will drive you crazy, is pressing the space bar prior to pressing the right arrow. For some reason *EDTASM+* sometimes ignores the space; other times it will use it as part of the label. For this one it's easiest to just retype the line.

The "multiply defined symbol" error can be generated with the same ease as bad label. Once you have figured out that *EDTASM+* doesn't like the ampersand symbol you substitute another letter and get this error. Use the symbol table generated by the assembler to keep track of the symbols used. You can use the options of *EDTASM+* to generate just a symbol table. (Example: A/NL/LP would send an error count and symbol table to the printer.) Also, the first five characters being the same can generate this error, sometimes! (Is this a bug?)

If you have ever attempted to use the global editing features of *EDTASM+* and were rewarded with a series of SEARCH FAILS for your efforts, don't lose faith. Using the commands you must remember that a space is a valid character. (Example: F LOOP1 would look for the word LOOP1 preceded by a space, using FLOOP1 to find the word.) Also, when using the renumbering option N, always move the text pointer to the beginning of text. Otherwise, renumbering will start at the current line of text. (Now how

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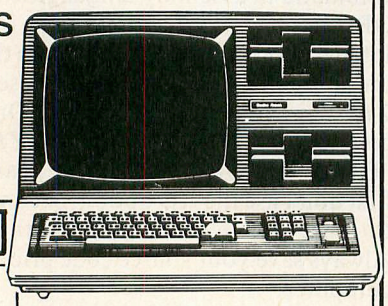

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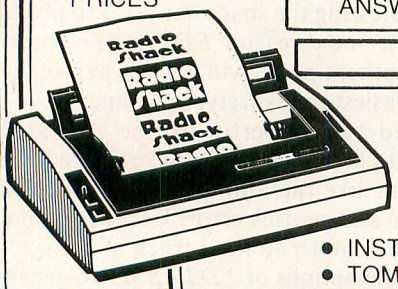

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did two line number 100s get in there?) Use the P# command first!

Okay, you've completed the program, you have saved the source code, the object code, and have a hard copy listing. Still, when you *CLOADM* and *EXEC* you get pretty graphic patterns, and you typed in a utility program! Hmmm, something is wrong! The most frequent cause is the *EXECute* location. The last line of the program should *always* be something like END START . Of course, some authors use words like ENTRY, BEGIN, MAIN, etc. These words all refer to where the program should begin running. If the author omits which label he is using for START, assume the first label of the program should be the starting address. The last line of text should always be something like END START. Otherwise, the assumed execution address is zero!

Finally, the error message that strikes fear into every assembly language programmer. "Bad opcode" — it's in the magazine, but look high and low, you can't find it anywhere else. You can't even figure out what it's supposed to do! As usual, there is a way around it. Hopefully there is a ML listing. Use the FCB to manually insert the byte codes. (Example: 1F 89 4D TAB (ML listing and opcode as in article.) Substitute the following *three* lines: FCB $1F FCB $89 FCB $4D (Remember only *one* number per FCB line).)

That's enough for this month. I would like to remind you that if you are having troubles with a program, starting this month, Dan Downard has a question and answer column. Please remember that incomplete questions are impossible to answer, so send questions with documentation and examples.

Back Issue Availability

Back copies of many issues of *the RAINBOW* are still available.

All back issues sell for the single issue cover price — which is $2 for copies of Volume I, Numbers 1-8 (through February, 1982), $2.50 for Volume I, Numbers 9, 10 and 12 (through June except May, 1982) and $2.95 for Volume II, Numbers 9, 10, 11, 12 (March, April, June and July 1983). Also $3.95 for Volume III, Numbers 3—7 (October 1983 through February 1984). In addition, there is a $3.50 charge *per order* for postage and handling if sent by United Parcel Service and $6 for orders sent U.S. Mail. UPS *will not* deliver to a post office box or to another country. This charge applies whether you want one back issue or all of them.

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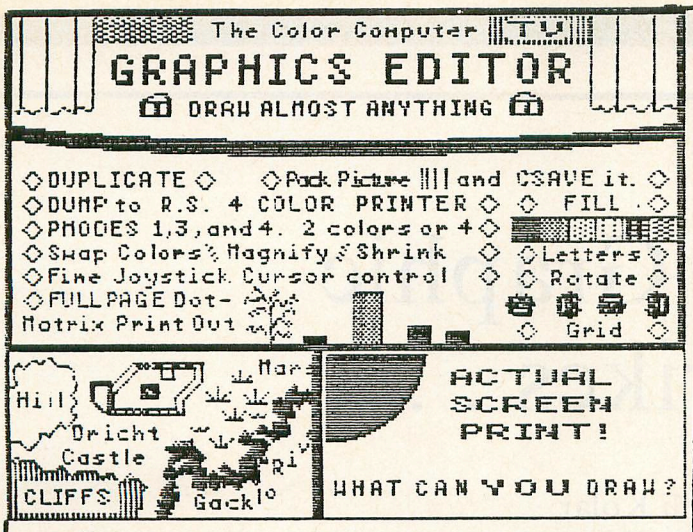

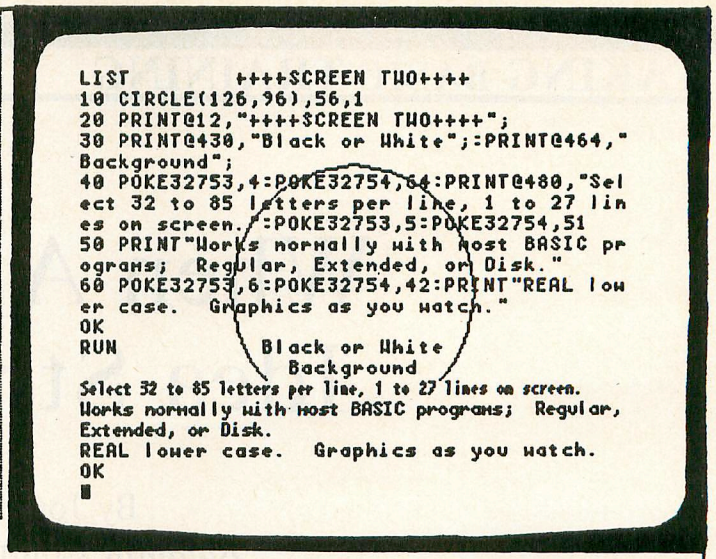

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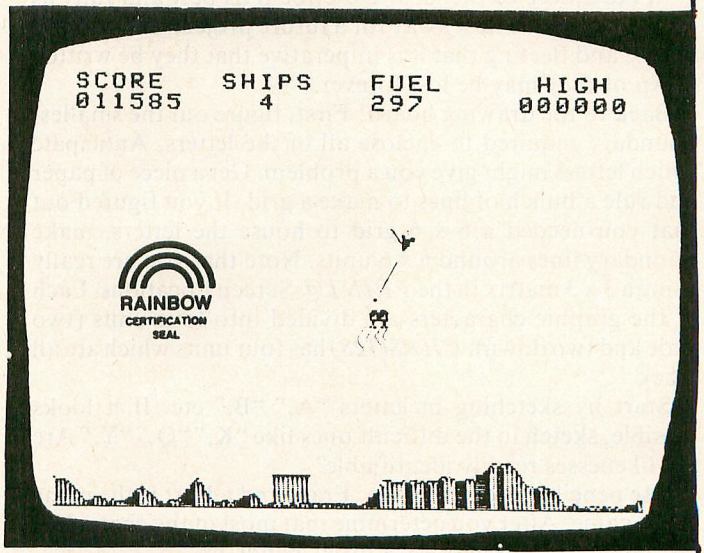

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When A Graphic Idea Strikes . . .

By Joseph Kolar
Rainbow Contributing Editor

Suddenly, you have an idea! You wonder if it is possible to make an alphabet out of the graphic characters available to your CoCo *[CHR$(128)* to *CHR$(255)]*. You can't recall seeing it done, and more importantly, wonder if you could do it. There is only one sure way to find out. Try it!

Before you dash off to the keyboard, mulling the idea over in your mind, visualize the problems you might encounter. Determine your abilities and reference library sources to see if they are well enough advanced to cope with the problems you anticipate. If you feel you are not ready to attack the problem at this point in time, it does not follow that in a few month's time you will not have acquired the necessary know-how to tackle the problem.

Make a note of the idea. Describe it as best and fully as you envision it. File it away for a future project. Ideas are so fragile and fleeting that it is imperative that they be written down or they may be lost forever.

Back to the drawing board! First, figure out the smallest boundary required to enclose all of the letters. Anticipate which letters might give you a problem. Get a piece of paper and rule a bunch of lines to make a grid. If you figured out that you needed a 6 x 6 grid to house the letters, make boundary lines around 6 x 6 units. Note that you are really using a 3 x 3 matrix in the *PRINT*@ Screen Locations. Each of the graphic characters are divided into four units (two wide and two down). *CHR$(128)* has four units which are all black.

Start by sketching in letters "A," "B," etc. If it looks feasible, sketch in the difficult ones like "K," "Q," "Y." Are the likenesses readily identifiable?

Use pencil to block them in. Erase and adjust is the name of the game. After you determine that most of the characters are adequate, you may try a little "hands-on."

Create a training aid at this point. (See Figure 1.) Fold a sheet of typing paper in half. Make two rows of eight squares. Divide each into four equal segments. Label them left to right as follows: 128; 143; 129; 130; 136; 132; 134; 137. Drop to the second row. Again, from left to right, number them: 135; 139; 142; 141; 133; 131; 138; 140. Color in the appropriate segments of *CHR$(128)* to *CHR$(142)*.

Notice the pattern. Top row: All on; all off. Next four: three of the four units are colored black, in a clockwise direction. Last two: diagonal down; diagonal up. Bottom row: four left blocks have one segment colored black and the last four have two adjacent segments colored black.

At the left edge of your training aid, in a column entitled "*PRINT*@," list vertically 0; 32; 64; 96; 128; 160; 192; 224. These are the rows above the horizontal centerline of the screen. A few spaces to the right of 0, continue in a second column: 256; 288; 320; 253; 384; 416; 448; 480.

On the right side, print under a column labeled, "COLOR": 143+16 yellow. Then, under the "+," continue with +32 blue; +48 red; +64 buff; +80 cyan; +96 magenta and +112 orange. If the colors on your monitor or TV screen are other than what you have listed, you can make appropriate notes.

Place the completed chart between the air vents of the CoCo. You will be able to refer in a logical sequence to the chart when looking for a shape. Under the shape will be *CHR$* number. You will find this chart useful so don't throw it away.

How would you create a letter using the graphics, *CHR$(128)* through *CHR$(143)*? Sketch in the shape of the letter. Consult your training aid to see which combinations you have to work with. Break up the 6 x 6 grid, so that you have four unit squares like the *CHR$* graphic element.

Look up and see which *CHR$* character is exactly the same as the contents of your 2 x 2 blocks.

A square-topped "a" will fit a 3 x 3 box nicely. The first row could be labeled [A$]; the second [B$] and the bottom row, [C$].

Putting them into program lines you would have:

```
10 A$=CHR$(129)+CHR$(131)+CHR$(130)
20 B$=CHR$(132)+CHR$(140)+CHR$(136)
30 C$=CHR$(133)+CHR$(143)+CHR$(138)
```

AA$ designated the completed letter by combining the elements of the three rows.

```
500 AA$=A$+B$+C$'square top
800 PRINT@32+2,AA$
```

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

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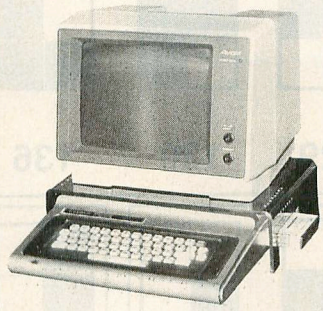

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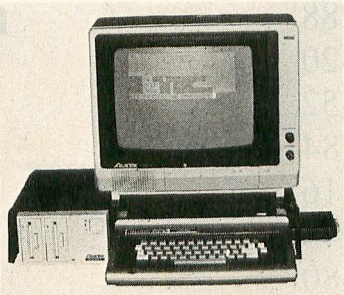
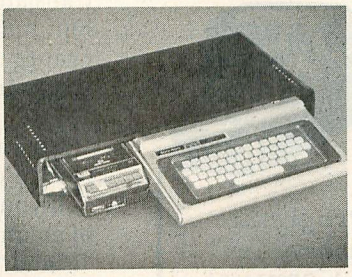


TS-5, C-1 & DD-3



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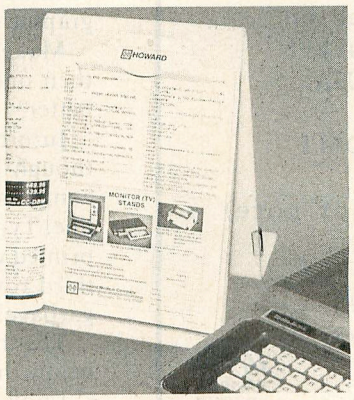

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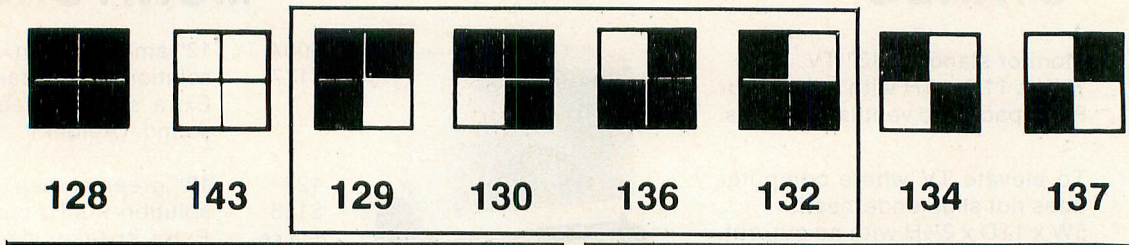
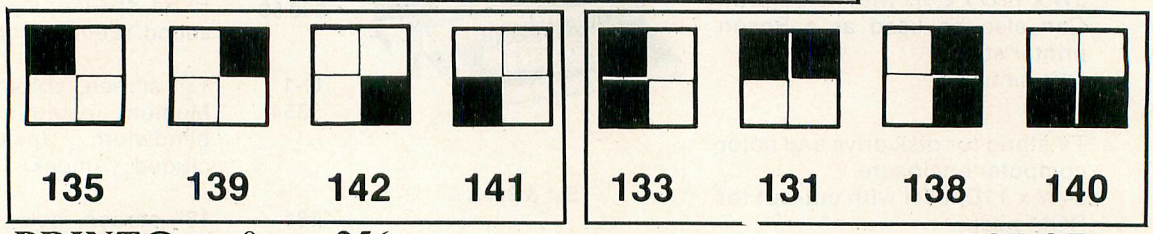
Figure 1





PRINT@		
	0	256
	32	288
	64	320
	96	352
	128	384
	160	416
	192	448
	224	480

	COLOR
143	+ 16 YELLOW
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This was done using concatenation, a long word that translates to [+] in BASIC. This is the sign for "adding to," but, unlike the plus sign, +7, it doesn't add something to change the total and thus becoming an invisible part of the result. In 2+1=3, the resultant 3 has the hidden parts, 2 and 1.

Concatenation is always visible. Concatenating 2+1 results in 21. Both 2 and 1 are visible in the resultant 21.

If you created an "A" with a pointed top, an odd number of columns would be required—five in this case. The letters "I" and "T" require an odd number of columns. Remember, you will still use the 6 x 6 grid or matrix because an even number of columns must be used to fill in the entire *CHR$* graphic character.

Make a sketch of the letter, "X," using six columns and then one that uses five columns. Which one do you like better?

In order to display the "A," we have a problem. Even though [AA$=A$+B$+C$] is a completed "A" in three component rows, it can't be printed using a simple program line. Type in and *RUN* lines 10-30; 500; 800. The top row is printed with the second row to the right of it, followed by the third row to the right of the second row. Interesting—but garbage!

The three rows that constitute the A must be printed one below the other.

Look in your manual at the "*PRINT*@ Screen Locations." Pick the row that starts just below the horizontal centerline—256. Notice you have the list on your handy training aid. Add one to 256 to leave a blank area at the left margin. Key in the following three lines:

```
800 PRINT@256+1,A$'top row
810 PRINT@288+1,B$'middle row
820 PRINT@320+1,C$'bottom row
```

RUN. Note you could have just as easily used *PRINT @257; PRINT@289; PRINT@321*. It is easier to refer to the starting number of each *PRINT*@ row and [+] whatever number you wish to move your A horizontally on the screen to a desired location. Try other numbers instead of [+1] but be sure to add the same offset to all three rows.

To make a five column, pointed A to see how it compares with a six column, square top A, you get:

```
40 D$=CHR$(143)+CHR$(134)+CHR$(143)
50 E$=CHR$(132)+CHR$(140)+CHR$(133)
60 F$=CHR$(133)+CHR$(143)+CHR$(133)
500 A1$=D$+E$+F$
```

Change the variable in lines 800-820 to D$; E$ F$ respectively. *RUN*. Which one do you like better?

It might be a good idea to compare them side by side. At the end of lines 800-820 add [;A$], [;B$], [;C$] respectively. *RUN*. Hey, something's wrong! The two letters run into each other. Have no fear!

There are a few ways to remedy the problem. You could go back and add [*+CHR$(143)*], an empty graphic block, to the ends of lines 10-60. A better way would be to create a variable, [SP$], a spacer. Insert:

```
5 SP$=CHR$(143)
```

Instead of adding [*+CHR$(143)*], 10 bytes of memory to each line, 23 add [+SP$] and use four bytes per line. Another way would be to add, either [*CHR$(143)*] or [+SP$] after each variable in lines 800-820. It would be: 800 PRINT @256+1, DCHR(143); A$+SP$' example using both methods in a single line.

After you experiment, choose your solution. Adjust the program lines to reflect it and *RUN* the program. You may find both letters okay but wonder if there are other possible A's.

Try to design other shapes. Always try to alter or improve all problems. Keep trying variants until you run out of ideas.

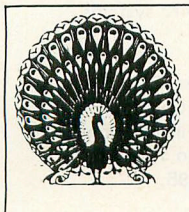
Get out your scrap paper and sketch out some other A's. If you find some new design or format for an A, see which program lines are altered. Assign it a new variable name and add additional lines to your program. In lines 800-820, add the components at the end of the line, remembering to add a semicolon between variables. This indicates that the last variable is to follow to the right of the previous variable. *RUN* and see how it compares with the others.

A good idea is to change lines 500-510, by adding a REM so you can recall which set of variables constitute a specific form of A.

```
500 'A$+B$+C$ square top
510 'D$+E$+F$ pointed top
```

To keep you honest, no further hints will be given. In the next article, we will consider the letter A further and develop more information about expanding this core program, that you are in the process of creating. Make as many A's using this format to see how many you can come up with.

An added project for you is to create an entire alphabet. Fool around with it. You made two A's and are creating more variants. There is no reason for you not to create all the letters of the alphabet and have fun getting familiar with the graphic blocks.



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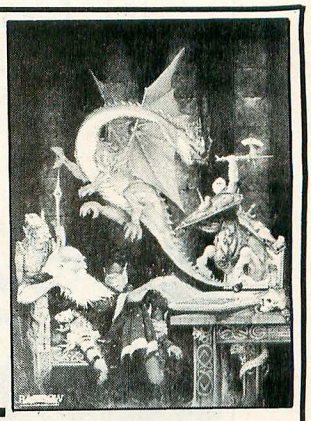

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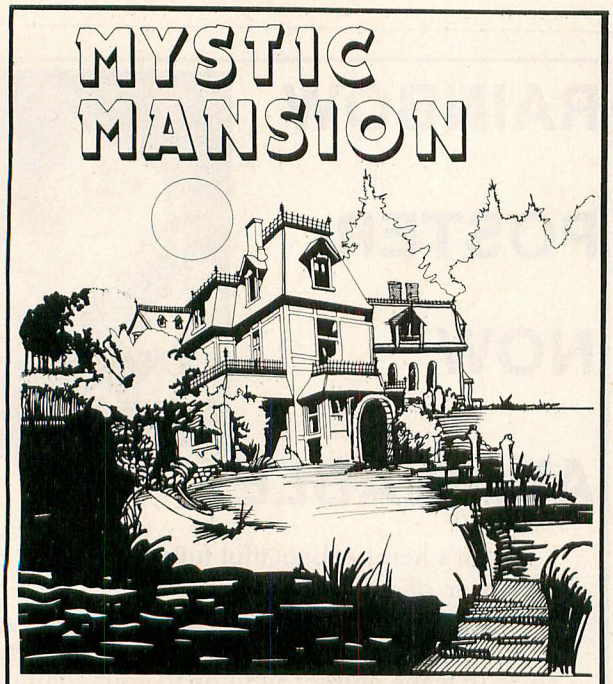

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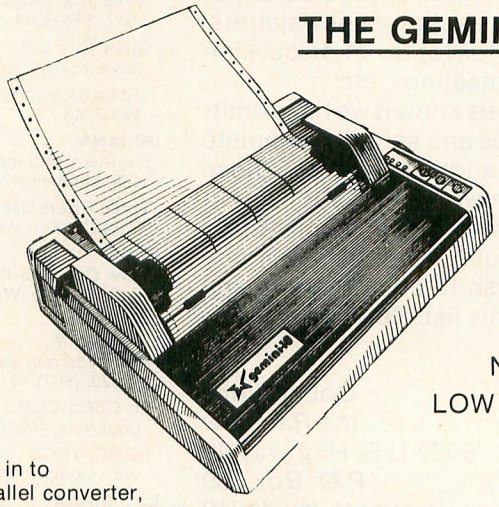

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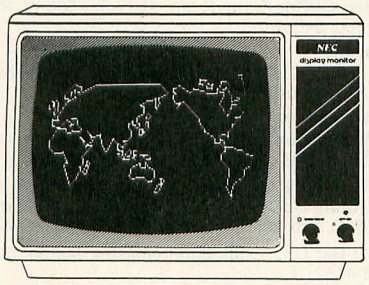

GET THE MOST FROM YOUR SYSTEM WITH AN NEC MONITOR PACKAGE!
Without a monitor, you'll never know just how good your graphics are. Word processing becomes less fatiguing, programming more enjoyable. NEC is famous for excellent color reproduction and tack-sharp resolution. We take the work out of adding the monitor to your system by including a custom plug-in monitor driver (with color, monochrome, and audio outputs), any required cables, and easy setup instructions. Buy with confidence—we've done the "homework" for you!
NEC 12" Color monitor (JC1212M) package ONLY $389*
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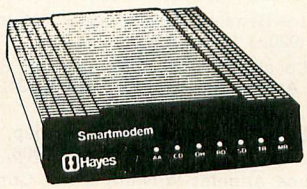
NEC 12" Amber screen (JB1205MA) package ONLY $219*
True lower-case and inverse video—just plug in the LCA-47. Special price with monitor purchase $66. (not available for Color Computer 2)

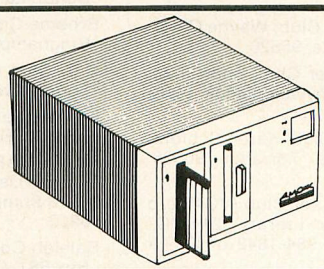
GET SMART!! GREAT DEAL ON HAYES SMARTMODEMS
Hayes 300 baud Smartmodem—the amazing programmable auto-dial, auto-answer modem, now in a special package deal for your Color Computer. Buy the Hayes for list price, and at NO EXTRA CHARGE receive the Colorcom/E smart terminal program (cartridge or disk), an RS232 cable, and setup instructions! Act now!
Hayes 300 baud Smartmodem package ONLY $289*
Hayes modem with CC cable only, $249*
Signalman Mark I modem, 300 baud direct connect, list $98, our price $86*



The revolutionary 3" disk system! Two compatible 156K drives in a compact enclosure. Uses the rigid, protected 2-sided cartridge that ha made others obsolete. Our package includes the Amdisk III, cable, disk controller, Disk BASIC manual, 12 cartridges, setup instructions, and a ML tape to disk program to help transfer your software! Everything you need, plus you save $50!

Package price ONLY $689* Amdisk III plus cable only $479*

Order Now!! (available for Color Computer 2, please specify)



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SKYLINE 64K Memory Upgrade Kits

8 guaranteed 200 n.s. 64K memory chips, solderless installation instructions, Skyline's 64K BOOT and PAGER programs (a $19.95 value). All for the super low price of $59.00! Order yours today!
(soldering required on Color Computer 2)

CoCo Community

We are compiling a list of Color Computer Clubs because of the many requests we have received. The CoCo Clubs may want to exchange newsletters, share ideas for topics of discussion at monthly meetings; etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs who have signed our "agreement form" will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

CoCo Clubs
the Rainbow
9529 U.S. Highway 42
P.O. Box 209
Prospect, KY 40059

ALABAMA

Birmingham Alabama Color Computer Club, Robert Matthews, 1725 14th Ave. S., Birmingham 35205, (205) 933-0887

ALASKA

Alaska Color Computer Users' Group, Rick McDannel, 430C Beluga Ave., Ft. Richardson 99505, (907) 428-0392

ARIZONA

Tucson 6809 CoCo Club, Steve Parkman, 902 S. Kolb Rd. Tucson, 85710, (602) 747-8233

ARKANSAS

Central Arkansas CoCo Club, Melinda Braslovsky, 1203 Erving Rdg., LP Cabot, 72023, (501) 982-8854

CALIFORNIA

CoCo Nutz Computer Club, Walter V. Seay, 68-461 Highway 86, Thermal, 92274, (619) 397-4252

Citrus Color Computer, Joseph Kohn, P.O. Box 699, San Bernadino, 92412

Joe Bennett, 1169 Florida Street, Imperial Beach, 92023, (474-6213)

Local Color, A CoCo Club of San Francisco, Andrew G. Kieval, P.O. Box 421242, San Fransico 94142

Los Angeles CoCo Users Group, Mark Randall, 2227 Canyon Rd., Arcadia, 91006, (213) 355-6111

Los Angeles-Wilshire Color Computer Users' Group,c/o Norm Wolfe, 269 S. Lafayette Park Pl., Los Angeles, 90057

Sacramento Color Computer Club, Wayne Chrisope, Pres., P.O. Box 9, Elverta, 95626

Silicon Valley Color Computer Club, Shaw Jipp, Pres., P.O. Box 61593, Sunnyvale, 94088, (408) 749-1947

South Bay Color Computer Club, Karen Schlotzhauer, 2545 W. 255th Place, Torrance, 90505, (213) 539-2439

Ventura County Color Computer Club (VC4), c/o Pete Lydall, Oxnard Public Library, 214 "C" Street,Oxnard, 93030, (805) 984-1842 or DATA (805) 984-1842

COLORADO

Lowry Microcomputer Club/CoCo Users' Group, Jerry D. Surritte, 2249 Moline St., Aurora, 80010, (303) 343-3273

FLORIDA

Broward CoCo Club, Sue Spahn, 11950 N.W. 29th FL 33582, (305) 741-4737

C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., FL 33582, (813)921-7510

Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216 (904) 721-0282

Northwest Florida CoCo Nuts, William N. Lamb, Pres., P.O. Box 1032, Fort Walton FL 35249, (904) 244-5281

ILLINOIS

Motorola Microcomputer Club, Steve Adler, Pres., 1301 Algonquin Rd., Schaumburg, 60196 , (312) 576-3044

Quad City CoCo Club, John Greve, Pres., 4211 Seventh Ave., Rock Island, 61201, (309) 786-8187

Town & Country CoCo, Kenwood, Chicago, (312) 493-3748

INDIANA

Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446

Three Rivers Users Group, Russ Garner, 533 Villa Park Ct., Fort Wayne, 46808

IOWA

Iowa City TRS-80 Users Group, Susan Chapler, R.R. 6, The Woods, Iowa City, 52240, (319) 351-5959

KENTUCKY

Roger Idstrom, 2603 Garden Lake Lane, Louisville, 40220, (502) 491-1853

Lo-CoCo Club Liason, 2820 Del Rio Place #27, Louisville, 40220, (502) 458-0649

LOCO-COCO, c/o Mike Standefer, 3141 Doreen Way, Louisville, (502) 458-6990

LOUISIANA

Red Stick Color Computer Club, Gary Cash, Pres., 8929 Metairie Drive, Baton Rouge, 70810, (504) 293-7799

MASSACHUSETTS

New England C.C. Users Group, Christopher E. Sweet, P.O. Box 255, Harvard, 01451, (617) 456-8291

Massachusetts CoCo Club, Jason Rahaim, Spring St., Lunenberg, 01462, (617) 582-6514

MICHIGAN

Greg Miller, P.O. Box 365, Haslett

Midland C.C. Club, Neil Drake, 709 Coolidge, Midland, 48640, (517) 631-2939

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

MISSISSIPPI

Singing River C.C. Club, Jerry P. Lowe, Sr., 2500 Fairly Road, Gautier, 39553

MISSOURI

North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078

MONTANA

Billings C.C. Club, Jayne Kenyon, 4306 Phillip Billings, 59101

NEW JERSEY

Bug 80 Users' Group, George R. Miller, Jr., Box 62, Glen Gardner, 08826

Loco CoCo Club, Bud Lavin, 73B Wavercrest Ave., Winfield Park, 07036

NEW YORK

Adirondack CoCo Club, Bill Edwards, Box 365, Bolton Landing, 12814, (518) 644-9927

Broome CoCo Club, Bucky Helmer, 57 Front St., Binghampton, 13905

C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 11357, (315) 895-7730

Kings Byte CoCo Club, Morty Libowitz, 1063 East 84th St., Brooklyn, 11236, (212) 763-4233

NORTH CAROLINA

TRS-80 Users' Group of Charlotte, Bill Hardin, 6613 Summerlin Pl., Charlotte, 28226, (704) 542-9959

Raleigh Color Computer Club, David Roper, P.O. Box 681, Garner, 27529

OHIO

CoCo Club of Youngstown, Timothy McFadden, P.O. Box 478, Canfield, 44406, (216) 788-4218

Cincinnati TRS-80 Users Group, R.A. White, 44 Dow Court, Fairfield, 45014

Dayton Area Color Computer Users' Group, Hal Brown, Sec., 5700 Troy Villa Blvd., Huber Heights, Dayton, 45424

Dayton CoCo Users' Group, Joseph P. Evans, 609 Applehill Dr., W. Carrollton, 45449

Miami Valley CoCo Club, R. Douglas Wales, Pres., 2065 Le Feure Rd., Troy, 45373

The Cleveland CoConuts, Paul Selig, 20734, Stanford Ave., Fairview Park, 44126, 333-2920

OREGON

Willamette Valley CoCo Users, Brian James, P.O. Box 11468, Eugene, 97440, (503) 687-9286

PENNSYLVANIA

Penn-Jersey Color Computer Club, Jerry Behler, 1231 Walnut St., Allentown, 18102, (215) 253-1238

Pittsburgh Color Group, William Tucker, P.O. Box 351, West Mifflin, 15122, (412) 466-3078

RHODE ISLAND

New England CoCo Nuts Color Computer Club, Eugene E. Bouley, Jr., Pres., P.O. Box 3165, Wayland Square, Providence, 02906

SOUTH CAROLINA

Midlands 80 Computer Club, Robert Rose, P.O. Box 7594, Columbia, 29202, (803) 776-4361

Metropolitan Greenville CoCo Club, Ed Lowe, P.O. Box 6, Gray Court, 29645, (803) 876-3928

TENNESSEE

Chattanooga CoCo Club, Jim Perkins/Jim Cox, P.O. Box 9825, Chattanooga, 37412, (615) 870-2439

Memphis Color Computer Users' Group, Ben Barton, Pres., 4903 Warrington Rd., Memphis, 38118, (901) 795-7075 or 362-5945

TEXAS

CoCo User Group, David Karam, 1809 Dexter, Austin, 78704, (512) 442-6317

International Color Computer Club, Inc., Ronald L. Garrett, Pres., 2101 East Main Street, Henderson, 75652, (214) 657-7834

UTAH

Ogden CoCo, Kathy Rush, 4535 S. 2600 W. Roy, Ogden, 84067

VIRGINIA

D.C./N. Va. C.C. Club, Jack Darling, 43 Donovan Dr., Alexandria, 22306, (703) 780-6159

WASHINGTON

Northwest Computer Club, Judy Gehman, E. 14012 Cataldo, Spokane, 99216, (509) 928-2169

WEST VIRGINIA

Mtn. State CoCo Users Group, Donald G. Barber, Jr., P.O. Box 295, Granville, 26534, (304) 599-4493

Mil-O-Bar C.C. Club, Jim Lemaster, Milton, (304) 743-4752

Blennerhassett CoCo Club, David Greathouse, Rt. 9, Box 119, Parkersburg, 26101

WISCONSIN

Southern Wisconsin CoCo Club, David C. Buehn, P.O. Box 411, Twin Lakes, 53181

CANADA

ALBERTA

Medley Computer and Electronics Club, P.O. Box 1267, Medley, T4A 2M0

NEWFOUNDLAND

Avalon CoCo Club, Mr. A.R. Thompson, Chairman, 10 Foran St., St. John's, A1E4G1

NOVA SCOTIA

Halifax Dartmouth CoCo Users Group, P.O. Box 572, Dartmouth, B2Y 3Y9, (902) 469-3656

ONTARIO

K-W C.C. Club, Peter Karwowski, 23 Hudson Cr., Kitchener, N2B 2V7

International Adventurer's Club, Maurice Dow, 84 Camberley Cres., Brampton, L6V 344

QUEBEC

Montreal TRS-80 Users Group, Jacobus P.C. Bagchus, Pres., 1176 Phillips Place, Suite 201, Montreal, H3B 3C8, (514) 861-3488

SASKATCHEWAN

Saskatoon Color Computer Club, Guy Tomashewski, 415-423 Pendygrasse Rd., Saskatoon, S7M 4Z2

MEXICO

Mexico City Color Computer Club, Marcelo Luft, Laja #232, 01900 Mexico D.F., Mexico City, 5-68-78-75

CoCo Clubs

new clubs

Editor:

I want to start a users group in the Savannah-Hinesville area. Anyone interested can phone me at (912) 368-3900 or write me at 417 Timber Lane Circle, 31313.

William Mason
Hinesville, GA

Editor:

On behalf of other CoCo enthusiasts, I would like to invite groups and individuals in the U.S. to correspond with fellow users in Australia.

We read with envy each month about the enormous amount of software and hardware available to your readers in the States. By communicating with interesed people, we may find ways to overcome some of the problems in getting that great stuff out here.

Thus by creating this "bridge" between our countries we hope to obtain and exchange information and ideas on the fantastic Color Computer.

Any initial contact can be made by writing to me c/o Penrith Users Group, 16 Tent Street, 2750 N.S.W.

David Cunningham
Kingswood, Australia

Editor:

I am writing to announce the formation of a new international Adventurer's Club for all CoCo users interested in playing or writing Adventure programs. Members will maintain contact through a monthly newsletter.

For more information contact me at 84 Camberley, Cres., Brampton, L6V 3L4, or call me at (416) 451-9452.

Maurice Dow, Ph.D
Ontario, Canada

Editor:

I would like to inform your readers of the Peoria Color Computer Club for the Color Computer users in Peoria, Ill. and the surrounding area. We meet on the second and fourth Saturdays of each month at 10 a.m. at the Germantown Hills Fire Station in Germantown Hills, Ill. For further information please contact me at 102 Twin Oaks Ct., 61611 or call (309) 694-4703.

Harold E. Brazee
East Peoria, IL

Editor:

We are forming a Color Computer Club in the St. John's Newfoundland area. For more information contact either Rollie Thompson at 10 Foran Street, A1E 4G1, or phone him at (709) 579-0883. You can also contact me at 33 Slattery Road, A1A 1Z7 or call me at (709) 722-1554 between 6 and 10 p.m.

Robert D.C. Taylor
Newfoundland, Canada

Editor:

We are starting a Color Computer Club serving the Acadiana, La., area. Our club is called "Cajun CoCo Club" and open to TRS-80 Color Computer, MC-10, TDP-100, Dragon, and other 6809 users. For more information call or write to me at 104 Karen St., 70560, or phone (318) 365-7706.

Bob Hoevel
New Iberia, LA

Editor:

The management of Saturnus True Data Services, Ltd., is proud to announce the forming of a new users' group in Montreal. We feel that this group fills a great need in this fine city and that we will enjoy a successful future.

As an announcement in your magazine, we would like to briefly point out some of the advantages of joining us and outlining a few services that can be enjoyed by anybody anywhere, if he/she wills.

A member of MTUG will enjoy our down time service which simply entails the use of another member's equipment as long as his/hers is indisposed. Also our members enjoy a purchasing service; anything the member buys through the club is charged at a discount. Members (anywhere) have use of our exclusive Bulletin Board System which includes a "classified ad" department and electronic mail. A newsletter is also published bimonthly and is available to anybody who wants it. Members get a free subscription to it. Advertising is also accepted from anybody at a nominal rate. This makes MTUG unique in Montreal.

Montreal TRS-80 Users Group, 1176 Phillips Place, Suite 201, Montreal, H3B 3C8.

William P.H. Bagchus
Quebec, Canada

Editor:

Even in the backwaters of old (but great) England we devour your magic magazine for its CoCo nutritional value. So, would you please give mention to our users club, The TRS-80 Colour Computer User Group. (Yea, we spell different, too!) Interested limeys should contact Ian Wild at 53 Darnton Rd., Ashton Under Lyne, Lancashire, England. Regards to the New World!

Robert Tinckler
Berkshire, England

Editor:

I am proud to announce the formation of a new club, the "Red Stick Color Computer Club."

This is the first CoCo club in the state of Louisiana.

Any suggestions or help from other clubs will be greatly appreciated.

For more information contact me at 8929 Metairie Dr., 70810, or call (504)293-7799.

Gary Cash
Baton Rouge, LA

Editor:

I am interested in forming a Color Computer Computer Club on Long Island, or joining an already existing one. Anybody with information, please contact me at 9 Stalker Lane, 11733 or phone (516) 928-7324.

John Enriques
E. Setauket, NY

Editor:

I would like to form a Color Computer Club in the Santa Clarita Valley (Newhall/Valencia/Canyon County/Sagus) in California. Any person interested may contact me at 23920 Fambrough St., 91321, or call (805) 254-0924.

David Barry, Jr.
Newhall, CA

Editor:

Please publish notice that a new club for the Color Computer is being formed. Those interested in becoming involved in the Pocono Home Computer Club may contact me at 705 Sarah Street, 18360 or call (717) 421-8762.

Kenneth VanCamp
Stroudsburg, PA

Editor:

I would like to announce a Kids' CoCo Users' Group. We exchange programs and miscellaneous ideas about the CoCo. Write me at 1301 Francis, 77840.

Larry Darcey
College Station, TX

Editor:

I live in Bayville (Ocean County), but go to school in Wayne. If anyone is interested in a club in Ocean County write me at 32 Pine Tree Dr., 08721, or call (201) 269-2054, or in North Jersey, William Paterson College, Heritage 210, Wayne, 07470.

John Knam
Bayville, NJ

Editor:

I am forming the Northwest Indiana Color Computer Club. Anyone interested can contact me at 1336 E. Elm #10, 46319, or call (219) 923-0584, or contact George Sievers, 3373 W. 80th Ave., Merrerville, Ind., 46410, or call (219) 769-2033.

Fred Kotynski
Griffith, IN

Editor:

I am interested in forming a CoCo users club in the Knoxville area. The club would include instruction in working with machine language and creating graphics. People interested should send their name, address and phone number to me at CoCo Users' Club, 10500 Sandpiper Ln., 37922.

Nick Bradbury
Knoxville, TN

Editor:

Can someone tell me if there is a CoCo Club in the Grand Rapids area? I have been active with CoCo Mug in Milwaukee until transferred to Michigan and would be interested in forming a users group here. Anyone interested in sharing experiences and knowledge of CoCo software and hardware contact me at 3908 Milan SW, 49509, or phone (616) 532-9290.

Mike Kwas
Wyoming, MI

What Is Your Compatibility Rating?

By Simon Clift

This is a program I have wanted to write for a long time, but a couple of weeks ago an idea struck me that really made sense. If you wanted to write a program that tested your compatability with another person, your questions would have to be on those things that couples found most annoying. I mean, forget nuclear arms, how many kids to have, or financial dealings, anyone can agree on those earthshakers. You have to get down to the nitty-gritty things that bother people who live around each other.

I developed this program following surveys of many couples to see what bothered them most. As a result it reflects some of the most aggravating little things.

The format is as follows:

10—15	Credits
20—90	Set-up and instructions
100—410	Questioning routine
420—440	Answer subroutine
450—550	Analysis

Try this program on your friends at a party perhaps. Also, if you like, you could add a routine to save the results on disk or tape for a dating service program, or just for fun to see if you and that special person were "meant to be." Anyhow, I hope you enjoy it.

Rainbow Check Plus

```
120 ..... 02B7  141
190 ..... 063C  149
240 ..... 095F  230
300 ..... 0CCB   89
380 ..... 105E  138
END ..... 1416   73
```

The listing:

```
10 'COMPATIBILITY TEST
12 'BY SIMON CLIFT
13 '1095 WITHERS CRES.
14 'KINCARDINE, ONTARIO
15 'CANADA  N0G 2G0
20 PCLEAR1:CLEAR 2000
30 DIMAN$(1,25)
40 CLS:PRINT"ARE YOU TWO MEANT T
O BE?"
50 PRINT:PRINT" THIS IS A TEST T
O SEE IF YOU   AND YOUR VIP ARE
COMPATIBLE."
60 PRINT" THIS TEST WILL ASK YOU
 TWENTY- FIVE QUESTIONS WHICH YO
U MUST   ANSWER HONESTLY."
70 PRINT" YOU ARE TO TAKE THE TE
ST FIRST,THEN YOUR VIP.  AND NO
PEEKING  AT THE OTHER ONE'S ANSW
ERS!!!"
80 PRINT:PRINT"PRESS ANY KEY TO
BEGIN..."
90 IF INKEY$="" THEN 90
100 FORI=0TO1
110 CLS:PRINT"WHAT'S YOUR FAVOUR
ITE PIZZA     TOPPING:"
120 PRINT"1. MUSHROOMS":PRINT"2.
 PEPPERONI":PRINT"3. ANCHOVIES":
PRINT"4. GREEN PEPPERS":PRINT"5.
 SAUSAGE":PRINT"6. A COMBONATION
 OF THE ABOVE   7. SOMETHING ELS
E"
130 QN=1:NA=7:GOSUB 420
140 PRINT"1. I LIKE THE BED COVE
RS TUCKED    IN WHEN I SLEEP.":P
RINT"2. NO, I LIKE THEM PULLED O
UT.":QN=2:NA=3:GOSUB 420
150 PRINT"IF SOMEONE ASKS MY AGE
 I MOST   OFTEN:":PRINT"1. TELL
THE TRUTH":PRINT"2. DON'T TELL T
HE TRUTH":PRINT"3. AVOID ANSWERI
NG":QN=3:NA=3:GOSUB 420
160 PRINT"IF I HAD A CHOICE OF T
HREE      POSSIBLE DESTINATIONS
ON A FREE HOLIDAY,I WOULD CHOOSE
:":PRINT"1. LONDON, ENGLAND":PRI
NT"2. HAWII":PRINT"3. SYDNEY, AU
STRALIA":QN=4:NA=3:GOSUB 420
170 PRINT"1. I THINK THAT TEACHE
RS HAVE NO   RIGHT TO HIT KIDS":
PRINT"2. I THINK THEY SHOULD STR
IKE      CHILDREN IF THE OCCASIO
N        REQUIRES":QN=5:NA=2:GOS
UB420
180 PRINT"1. TOILET PAPER SHOULD
 BE HUNG     SO THAT IT COMES OF
```

(Simon Clift is a 16-year-old student at Kincardine District Secondary School, Kincardine, Ontario. He has had several programs published with Prism Software, and has owned his CoCo for 1½ years.)

Custom Software Engineering, Inc.

807 Minutemen Causeway (D-2), Cocoa Beach, Florida 32931
(305) 783-1083 For information or technical support, please call between 5:30 and 8:30 P.M. Eastern time.

*RAINBOW REVIEW DATES

*JAN '83

DISK DOUBLE ENTRY - If you have spent hours trying to balance your Debits and Credits, this program is for you! Designed for small business, club, and personal use. Enter transactions in a journal type format. Program will maintain current account balances, produce Trial Balance, Income, and Balance Sheet reports and complete Account Ledgers. Will handle up to 300 accounts including report headings and totals. Up to 1400 average transactions on a diskette. Summary reports and four levels of subtotals available. REQUIRES 32K and a user understanding of standard double entry accounting concepts. - $44.95 in BASIC with Machine Language subroutines.

*DEC '83

STATEMENT WRITER - For use with (and requires) Disk Double Entry. Produces statements suitable for billing from your Receivable accounts. Provides mailing labels to use with your statements and account summaries. Designed and documented to allow you to change formats to accommodate your own special needs. $34.95.

*OCT '82

DISK DATA HANDLER - 64K - Designed to use the full 64K RAM, but may also be configured for 32K. Uses standard ROM's - No special operating system required! Allows you to design disk data files for your specific needs. You define a basic record of up to 14 fields and 246 characters. Provides fast selection and sorting based on any field or combination of fields in this record. Powerful on screen input and update. User defined output of reports to screen, printer, or disk files which may be read by your BASIC programs for any computational or special formatting requirements. Printer reports allow headings, page breaks, and page numbering, and let you pass control codes to drive your printer's special features. Maximum number of records you may work with at one time will depend on RAM configuration and record size - 64K (32K) 1850 (500) - 21 char records, 179 (49) - 246 char records. An optional Extended record linked to the basic record may also be defined. The size of this Extended record is not a factor in determining maximum number of records. Will provide the growth capability needed for your increasingly sophisticated applications. NOW - also includes a listing of a short program to read directory information from your disks and produce a combined file index. $54.95 in BASIC with Machine Language subroutines.

*JUNE '82

DATE-O-BASE CALENDAR - Puts you in charge of your schedule! Graphically displays any monthly calendar between 1700 and 2099. You put in up to twelve 28 character memos per day - calendar shows where the memos are -call up of day shows details. Use for appointments and a log of past activity. Study the chronology of the American Revolution or note the day your mortgage will be paid off. Search capability allows you to list or print all memos between two specified dates or only ones meeting key word criteria. Date computation shows elapsed time between two dates in days, weeks, months, and years. REQUIRES 32K in BASIC.
TAPE DATE-O-BASE CALENDAR - $16.95 - (max. 400 memos/tape file).
DISK DATE-O-BASE CALENDAR - $19.95 - (over 4,000 memos/disk - max. 300 memos/month).

*RAINBOW REVIEW DATES

*NEW

COMMAND STREAM PROCESSOR - *Adds a* new dimension to the power of your *Color Computer!* A program to run your other programs. Will allow you to prepackage a stream of direct system commands as well as INPUT and LINE INPUT to your BASIC program. This results in a totally automated stream of activity. If you understand your computer and the flow of activity required for your total operation, you are ready for the power of Command Stream Programming. In completely relocatable Machine Language - $19.95.

*NOV '83

That's INTEREST-ing - Time to let your computer do some real computation! This program will help you solve problems dealing with time, money, and INTEREST. Calculates present value, future value, and capital recovery for any combination of payments you specify. Rate of Return computation to predict how hard your money will be working. Special section to compute bond yields (current and to redemption). Amortization schedules about any way you want them - even allows you to change terms in mid schedule! All answers available on screen or printer. $29.95 in BASIC.

*SEP '82

MATH TUTOR - Five programs that go from math fact (+, −, X, /) drill to full addition, subtraction, multiplication, and division at four levels of difficulty. Provides a step by step approach with error correction and rewards for good performance. - $13.95 in BASIC.

*SEP '82

SPELLING TEACHER - Up to 200 of their spelling words stored on tape or disk are presented in four lively study modes including a scrambled word game. - $12.95 in BASIC.

*AUG '82

ALPHA-DRAW - A subroutine designed to let you easily add characters to your graphic displays. You define X and Y coordinates and a string variable of one or more characters and Alpha-Draw will do the rest. Includes all keyboard characters. Comes with instructions for a true line numbered merge of tape files. Works great with the Screen Print program! - $8.95 in BASIC.

*MAY '82

GRAPHIC SCREEN PRINT PROGRAM - Works in ALL PMODES and lets you shift screen image anywhere on the printed page. Relocatable code lets you use all of your 16K or 32K machine. Available for Color Basic 1.0 and 1.1/1.2. Use EXEC 41175 to see which you have and SPECIFY with order. In Machine Language.

SPECIFY PRINTER TYPE

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ALL LISTED PROGRAMS

```
 THE TOP      OF THE ROLL.":PRINT
"2. NO, IT SHOULD COME OFF THE
    BOTTOM OF THE ROLL.":QN=6:NA
=2:GOSUB 420
190 PRINT"WHEN DRIVING ON AN OPE
N HIGHWAY I USUALLY GO:":PRINT"1
. BELOW THE SPEED LIMIT":PRINT"2
. AT THE SPEED LIMIT":PRINT"3. A
BOVE THE SPEED LIMIT":QN=7:NA=3:
GOSUB420
200 PRINT"1. PARTIES ARE FUN TO
GO TO, BUT    I HATE THROWING THE
M.":PRINT"2. I LIKE TO THROW PAR
TIES, BUT     I HATE TO GO TO THE
M.":PRINT"3. I THINK IT'S FUN TO
 BOTH GO      TO AND THROW PARTIE
S.":PRINT"4. I DON'T LIKE PARTIE
S AT ALL.":QN=8:NA=4:GOSUB 42
210 PRINT"I THINK THAT AFTER WAT
ERGATE,   RICHARD NIXON:":PRINT"
1. GOT WHAT HE DESERVED":PRINT"2
. SHOULD HAVE GOTTEN LOTS WORSE3
. WAS RAILROADED":QN=9:NA=3:GOSU
B 420
220 PRINT"1. I ENJOY EATING SPIC
Y FOOD.":PRINT"2. I HATE SPICY F
OOD.":QN=10:AN=2:GOSUB 420
230 PRINT"1. I USUALLY TEND TO L
EAVE          CLOSET DOORS, AND D
RAWERS        OPEN A BIT":PRINT"2
. SLOB, I CLOSE THEM ALL THE
  WAY.":QN=11:NA=2:GOSUB 420
240 PRINT"1. I LIKE TAKING PHOTO
S OF          PLACES I'VE BEEN, F
AMILY, AND    FRIENDS.":PRINT"2.
PHOTOGRAPHS BORE ME, I'M MORE
INTERESTED IN THE PEOPLE AND
PLACES THEMSELVES.":QN=12:NA=2:G
OSUB 420
250 PRINT"IF I WANT A LOAF OF BR
EAD OR A  MAGAZINE, AND I'M LESS
 THAN ONE MILE FROM THE STORE, I
 USUALY":PRINT"1. DRIVE":PRINT"2
. BICYCLE":PRINT"3. WALK":PRINT"
4. FIND SOMEONE ELSE TO GO":QN=1
3:NA=4:GOSUB 420
260 PRINT"1. THERE'S NOTHING WRO
NG WITH AN    AFTER-DINNER SNACK.
":PRINT"2. I NEVER EAT AFTER DIN
NER TILL    BREAKFAST.":QN=14:NA=
2:GOSUB 420
270 PRINT"1. I'D GO BOWLING RATH
ER THAN       TO A DANCE.":PRINT"
2. NO, DANCING IS MUCH MORE FUN
3. ARE YOU KIDDING? I WOULDN'T
   BE CAUGHT DEAD DOING EITHER":
QN=15:NA=3:GOSUB 420
280 PRINT"1. I EAT BREAKFAST AS
SOON AS I     GET UP.":PRINT"2. I
 HAVE TO BE UP AWHILE BEFORE   I
```


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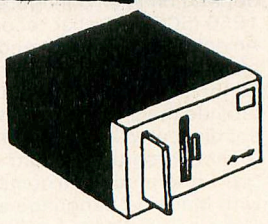

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```
 START EATING.":PRINT"3. I RAREL
Y EVER EAT BREAKFAST.":QN=16:NA=
3:GOSUB 420
290 PRINT"AT A FOREIGN MOVIE I P
REFER:":PRINT"1. WRITTEN SUBTITL
ES":PRINT"2. DUBBED VOICES":QN=1
7:NA=2:GOSUB 420
300 PRINT"1. I OFTEN GO TO BED A
FTER MID-     NIGHT":PRINT"2. ME?
 ONLY SOMETIMES.":PRINT"3. NO, I
 RARELY STAY UP THAT        LATE.
":QN=18:NA=3:GOSUB 420
310 PRINT"1. THINK THINGS LIKE R
EMOTE         CONTROL TV AND AUTO
 GARAGE       DOOR OPENERS ARE PA
RT OF         TODAY'S KIND OF LIV
ING.":PRINT"2. NONSENSE, HEALTHY
 PEOPLE WHO    USE THAT KIND OF
THING ARE      LAZY!":QN=19:NA=2
:GOSUB 420
320 PRINT"1. I ENJOY HAGGLING MY
 WAY TO A     BETTER PRICE.":PRIN
T"2. I NEVER DO, IT EMBARRASES M
E.":QN=20:NA=2:GOSUB 420
330 PRINT"1. I'M FOR CAPITAL PUN
ISHMENT.":PRINT"2. EXECUTIONS AR
E ONLY JUSTIFIED   IN SOME CASES
.":PRINT"3. CAPITAL PUNISHMENT S
HOULD BE     BANNED!":QN=21:NA=3:
GOSUB 420
340 PRINT"1. BALLET PUTS ME TO S
LEEP!":PRINT"2. BALLET? I LOVE B
ALLET!":QN=22:NA=2:GOSUB 420
350 PRINT"1. I DON'T LIKE PEOPLE
 TO BE        OVERWEIGHT.":PRINT"
2. OH, THERE'S NOTHING WRONG
   WITH BEING 10-20 POUNDS OVER.
":QN=23:NA=2:GOSUB 420
360 PRINT"1. I THINK DRESSING UP
 IS A PAIN2. I LOVE FANCY DRESSI
NG NOW AND    THEN.":QN=24:NA=2:G
OSUB 420
370 PRINT"1. IT IS CORRECT TO SA
Y TOmayTO":PRINT"2. NO, ONE SHOU
LD SAY TOmahTO":QN=25:NA=2:GOSUB
 420
380 IF I=1 THEN 450
390 PRINT" NOW BRING IN YOUR VIP
 AND LET  HIM/HER TAKE THE TEST.
 DON'T     TELL THEM ANY OF YOUR
ANSWERS SOTHAT THE RESULTS WILL
BE         ACCURATE":PRINT:PRINT"
PRESS ANY KEY TO BEGIN..."
400 IF INKEY$="" THEN 400
410 NEXT I
420 INPUT">>ANSWER";AN$(I,QN)
430 AN$(I,QN)=RIGHT$(AN$(I,QN),1
)
440 IF VAL(AN$(I,QN))<1 OR VAL(A
N$(I,QN))>NA THEN 420 ELSE CLS:R
ETURN
450 PRINT" THAT COMPLETES THE TE
ST. I AM  NOW TESTING THE RESULT
S...."
460 FOR I=1 TO 25
470 IF AN$(0,I)=AN$(1,I) THEN PT
=PT+4
480 NEXT I
490 IF PT<50 THEN PRINT:PRINT" S
ORRY, YOU TWO JUST DON'T SEEM TO
 BE COMPATIBLE.":PRINT" ON THE O
THER HAND, PEOPLE WHO  SEEM INCO
MPATIBLE HAVE BEEN     KNOWN TO
LAST A LIFETIME        TOGETHER.
 DON'T YOU KNOW SOME OFTHEM?":GO
TO 530
500 IF PT>=50 AND PT<=70 THEN PR
INT:PRINT"IF YOU'RE YOUNG OR ESP
ECIALLY   FLEXIBLE, YOU MIGHT MA
KE IT TO- GETHER.":GOTO 530
510 IF PT>=70 AND PT<90 THENPRIN
T:PRINT"WITH A FEW COMPROMISES,
YOU      SHOULD HAVE A VIABLE PAR
NERSHIP.":GOTO 530
520 IF PT>=90 THEN PRINT:PRINT"A
 MATCHMAKER'S DREAM."
530 PRINT" OUT OF A POSSIBLE 100
, YOU TWO SCORED";PT
550 END
```


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Inputting Your Role Playing Characters

By Bob Albrecht and George Firedrake

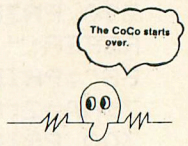
Last time we showed you two simple programs called *KEYBOARD-MEMORY-TAPE* and *TAPE-MEMORY-SCREEN*. Next, let's write a program to put information about role playing characters on a cassette tape. When you run our program, the CoCo asks for the name of your character and the values of the seven basic characteristics. Here is what happened when we entered Aloysious's characteristics.

```
CHARACTERS TO TAPE
NAME OF CHARACTER? ALOYSIOUS
STR? 10
CON? 11
SIZ? 10
INT? 12
POW? 10
DEX? 12
CHA? 9
OK TO PUT ON TAPE (Y OR N)?
```

After the CoCo finished putting the information in the tape buffer the screen looked like this:

```
CHARACTERS TO TAPE
NAME? ALOYSIOUS
STR? 10
CON? 11
SIZ? 10
INT? 12
POW? 10
DEX? 12
CHA? 9
OK TO PUT ON TAPE (Y OR N)?
ABOVE RECORD IS IN TAPE BUFFER
TO ENTER A RECORD, PRESS SPACE
TO CLOSE FILE, PRESS 'C'
```

When the CoCo asks OK TO PUT ON TAPE (Y OR N)?, you might type N for no. In this event, you will see the following.

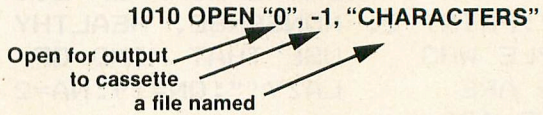



```
CHARACTERS TO TAPE
NAME? ■
```

Here is the first part of the program.

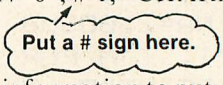
```
1000 REM**CHARACTER RECORDS
1010 OPEN "O", -1, "CHARACTERS"
1020 CLS
1030 PRINT "CHARACTERS TO TAPE"
```

Line 1010 tells the CoCo to open a cassette file for output. The file is called *CHARACTERS*.



Line 1010 is written for Extended Color BASIC. If you are using Color BASIC, write line 1010 as follows:

```
1010 OPEN "O", #-1, "CHARACTERS"
```



Next, let's get the information to put on tape, the name of the character and the seven basic characteristics.

```
1100 REM**GET CHARACTER INFO
1110 PRINT: INPUT "NAME"; NAYM$
1120 PRINT
1130 INPUT "STR"; STR
1140 INPUT "CON"; CON
1150 INPUT "SIZ"; SIZ
1160 INPUT "INT"; INQ
1170 INPUT "POW"; POW
1180 INPUT "DEX"; DEX
1190 INPUT "CHA"; CHA
```

After someone has entered the information about a character, the CoCo wants to know if it is okay to put this information into the cassette file.

```
1200 REM**OK TO PUT ON TAPE?
1210 PRINT
1220 PRINT "OK TO PUT ON TAPE (Y
 OR N)?"
1230 K$=INKEY$:IF K$=""THEN 1230
1240 IF K$="Y" THEN 1310
1250 IF K$="N" THEN 1020 ELSE 12
30
```

If someone typed Y for yes, the CoCo writes the character's name and seven basic characteristics into the tape buffer.

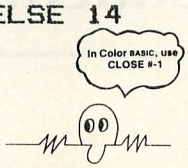
```
1300 REM**PUT RECORD ON TAPE
1310 PRINT #-1, NAYM$,STR,CON,SI
Z,INQ,POW,DEX,CHA
1320 PRINT @416, "RECORD IS IN T
APE BUFFER"
```

Now you get to choose whether to enter another character record or to close the file.

```
1400 REM**WHAT TO DO NEXT
```

(Bob Albrecht and George Firedrake are two of the most prolific authors in the microcomputer world today. Specialists in writing for beginners, they are authors of numerous books, including TRS-80 Color BASIC.)

```
1410 PRINT "TO ENTER A RECORD, P
RESS SPACE"
1420 PRINT "TO CLOSE THE FILE, P
RESS 'C'";
1430 K$=INKEY$:IF K$=""THEN 1430
1440 IF K$=" " THEN 1020
1450 IF K$="C" THEN 1510 ELSE 14
30
1500 REM**CLOSE THE FILE
1510 CLOSE -1
1520 CLS
1530 PRINT "THE FILE IS CLOSED"
1540 END
```



Your Turn.

Write a program, beginning at line 2000, to read and display character records from the character file on a cassette tape.

Also write a program, beginning at line 3000, to search a cassette tape for a record by name of character. Of course, you will have to rewind the cassette each time before you do this.

Aloysious Anonymous is an average character, destined to be other than an adventurer. Here he is at age 16, a young person living in a village near Triford in Wundervale.

Character Name Aloysious Anonymous Age 16 Sex M Race HUMAN
Background Villager, lives in a village near Triford in Wundervale

STR	10			HIT PTS.	0 1 2 3 4 5 6 7 8 9 10
CON	11			(11)	12 13 14 15 16 17 18 19 20 21 22 23 24 25
SIZ	10				
INT	12	Idea	60	Armour	Cloth, I paint
POW	10	Luck	50		
DEX	12	Dodge	60	POW PTS.	0 1 2 3 4 5 6 7 8 9 (10)
CHA	9	Persuade	45	11	12 13 14 15 16 17 18 19 20 21 22 23 24 25

SKILLS		WEAPONS	DAMAGE	ATTACK	PARRY	BRK PTS.
CLIMB	55	Fist	103	50		
FIRST AID	50	Rock	104	45		
HIDE	55	Staff	108	25	30	15
JUMP	45					
LISTEN	50					
MOVE QUIETLY	25					
SPOT HIDDEN	30					
SWIM	20					
THROW	45	SPELL	%	SPELL		%

EQUIPMENT MONEY

In future episodes of "GameMaster's Apprentice," we will expand our simple programs to include more information about a character, as suggested by the character sheet.

- The numbers under SKILLS are success percentages for performing the skill under certan conditions. Aloysious has a 55 percent chance of CLIMBing and a 45 percent chance of connecting when he THROWs.
- Do you have a printer? If so, think about how to write a program to print a blank character sheet or a program to print a character sheet containing information about a character.
- Yes, we want to put everything on a character sheet in a cassette file and read it back when we want to store it in memory or display it on the screen. Too much for a screenful! So, think about how to organize and present a complete character record in memory and on the TV screen.

The items listed on the character sheet are only a beginning. Many other skills are possible. Aloysious, at age 16, has not acquired magical spells. We have included nothing under EQUIPMENT or MONEY. The description of a character is open-ended. Please keep that in mind when you write programs.

The Name File

We suggest a program for you to write. It goes like this. Type *RUN* and you see:

```
RANDOM NAMES TO CASSETTE
NAME STRUCTURE?
```

The CoCo is waiting for you to enter a consonant-vowel structure for the names you want it to randomly contrive. Okay, let's try CVCVC for Consonant-Vowel-Consonant-Vowel-Consonant.

```
RANDOM NAMES TO CASSETTE
NAME STRUCTURE?
CVCVC
CONAN
PUT ON CASSETTE (Y OR N)? ■
```

If you press the Y key, the CoCo writes the name on the cassette. If you press the N Key, it doesn't write the name on the cassette. In either event, next you see:

```
RANDOM NAMES TO CASSETTE
NAME STRUCTURE? CVCVC
CONAN
PUT ON CASSETTE (Y OR N)? Y
TO QUIT, PRESS 'Q'
FOR ANOTHER NAME, PRESS SPACE
FOR NEW STRUCTURE, PRESS 'S'
```

If you press the Q key, the CoCo closes the file and stops. You decide what it says on the screen to announce what it has done. If you press the [SPACE] bar, the CoCo generates another name using the same name structure. If you press the S key, the CoCo asks you for a new name structure.

Hmmmm . . . you might find the following subroutine useful.

```
30000 REM**GET 1 KEY SUBROUTINE
30010 KK$=INKEY$
30020 IF KK$="" THEN 30010
30030 RETURN
```

When you want the CoCo to wait for a keypress, simply write *GOSUB30010*, then use KK$ to find out what key was pressed.

Rainbow Check Plus

1299	01A7	119
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The listing:

```
1000 REM**CHARACTER RECORDS
1010 OPEN "O", -1, "CHARACTERS"
1020 CLS
1030 PRINT "CHARACTERS TO TAPE"
1099 '
1100 REM**GET CHARACTER INFO
1110 PRINT: INPUT "NAME"; NAYM$
1120 PRINT
```

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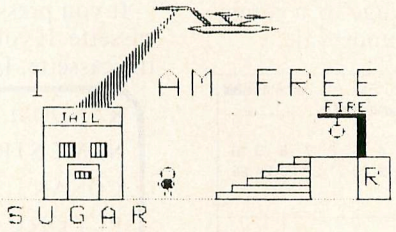

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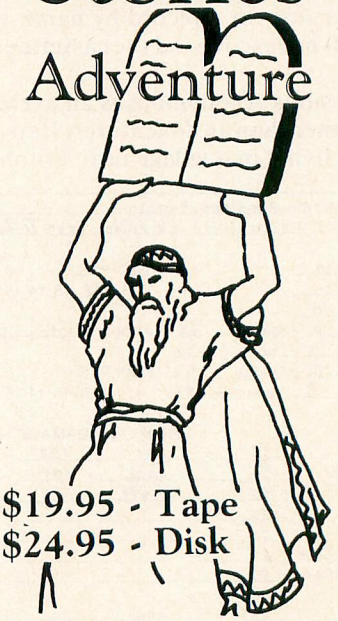

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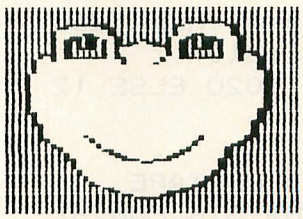

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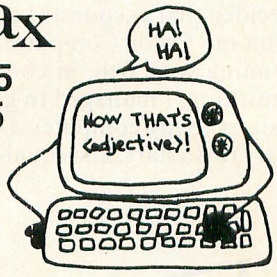

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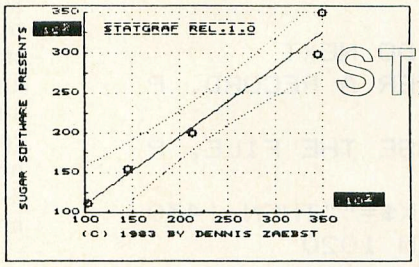

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```
1130 INPUT "STR"; STR
1140 INPUT "CON"; CON
1150 INPUT "SIZ"; SIZ
1160 INPUT "INT"; INQ
1170 INPUT "POW"; POW
1180 INPUT "DEX"; DEX
1190 INPUT "CHA"; CHA
1199 '
1200 REM**OK TO PUT ON TAPE?
1210 PRINT
1220 PRINT "OK TO PUT ON TAPE (Y
 OR N)?"
1230 K$=INKEY$:IF K$=""THEN 1230
1240 IF K$="Y" THEN 1310
1250 IF K$="N" THEN 1020 ELSE 12
30
1299 '
1300 REM**PUT RECORD ON TAPE
1310 PRINT #-1, NAYM$,STR,CON,SI
Z,INQ,POW,DEX,CHA
1320 PRINT @416, "RECORD IS IN T
APE BUFFER"
1399 '
1400 REM**WHAT TO DO NEXT
1410 PRINT "TO ENTER A RECORD, P
RESS SPACE"
1420 PRINT "TO CLOSE THE FILE, P
RESS 'C'";
1430 K$=INKEY$:IF K$=""THEN 1430
1440 IF K$=" " THEN 1020
1450 IF K$="C" THEN 1510 ELSE 14
30
1499 '
1500 REM**CLOSE THE FILE
1510 CLOSE -1
1520 CLS
1530 PRINT "THE FILE IS CLOSED"
1540 END
```

FANTASY ROLE PLAYING GAMES

Millions of young people, and many not-so-young, are playing fantasy role playing games. A role playing game is a game in which one or more players create and control characters (adventurers) who live their imaginary lives in a specially made game world. The game world is created, managed, and operated by a GameMaster (GM), also called a referee, adventure master, or dungeon master (DM).

Most people who play role playing games use a formal rule system. Some of the best known are shown below.

Champions. *From Hero Games, 92A 21st Avenue, San Mateo, CA 94402.*

Dungeons & Dragons (D&D). *From TSR Hobbies, P.O. Box 756, Lake Geneva, WI 53147.*

RuneQuest (RQ). *From Chaosium, P.O. Box 6302, Albany, CA 94706.*

Tunnels & Trolls (T&T). *From Blade, Box 1467, Scottsdale, AZ 85252.*

Worlds of Wonder (WOW). *From Chaosium, P.O. Box 6302, Albany, CA 94706.*

Most programs in "GameMaster's Apprentice" are based on the game system used in ***RuneQuest, Worlds of Wonder,*** *and* ***Adventurer's Handbook.*** *If you are a beginner, we suggest you try the following books.*

Adventurer's Handbook: A Beginner's Guide to Role Playing Games *by Bob Albrecht & Greg Stafford.*

Through Dungeons Deep *by Robert Plamondon.*

Both are available from Reston Publishing Company, 11400 Sunset Hills Road, Reston, VA 22090.

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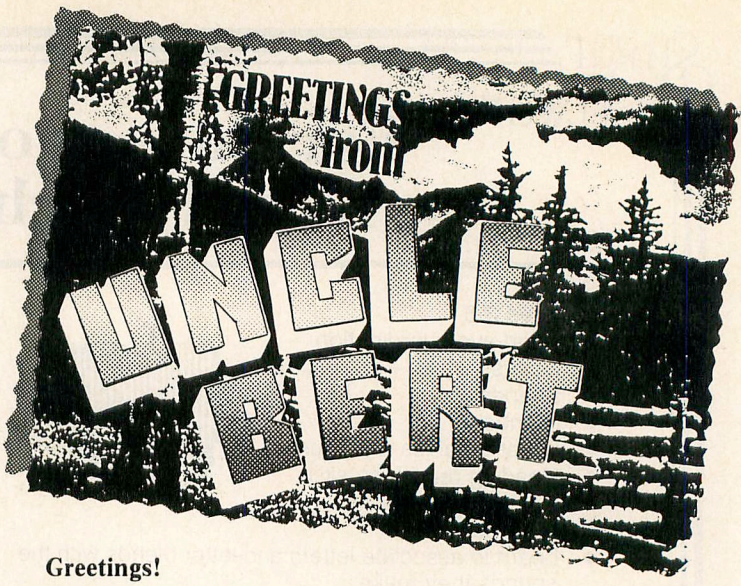
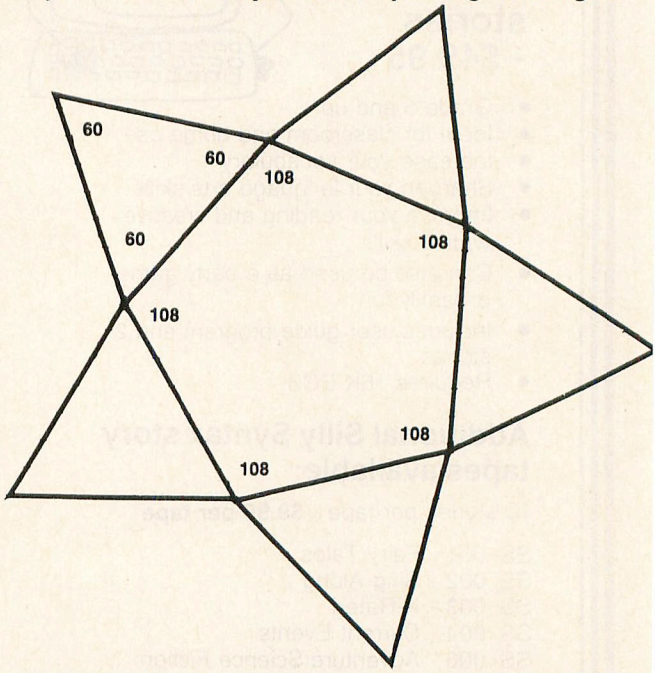


Greetings!

I sat out on the front porch the other night, looking at the stars. Then I heard an ominous click — Bertha (may her name be whispered with reverence among the immortals) had locked me out. It was freezing cold out there, but I got to look at all the stars in the sky for a long time. The stars out here in the country are bigger and brighter than city stars, you know. Anyhow, I started thinking about stars, and decided that as soon as I got inside the house I would try a few on my Color Computer. I spent the rest of the night communing with Ben, in confined but cozy quarters. The next morning, I managed to get inside the house, and went downstairs to my computer. I thought about several ways I might try to do stars, and equal-sided, equal-angled triangles.



(W. Bert Woofensburger ["Uncle Bert"] manages a hog and corn farm near Ypsilanti, Mich. He has recently acquired a Color Computer and is learning LOGO. Woofensburger's editor and assistant, Dale Peterson, writes for a living. His recent books include "Genesis II: Creation and Recreation With Computers" and "Intelligent Schoolhouse: Readings On Computers and Learning." He is currently working on a book about Color LOGO with Don Inman and Ramon Zamora, to be published in 1984.)

Just to play around and remind myself about the angles involved, I made an equal-sided, equal-angled triangle:

```
TO TRIANGLE
  REPEAT 3 (FD 60 RT 120)
  END
```

And I made an equilateral pentagon:

```
TO PENTAGON
  REPEAT 5 (FD 60 RT 72)
  END
```

Then I played around with triangles and pentagons that had variable sides:

```
TO TRIANGLE2 :N
  REPEAT 3 (FD :N RT 120)
  END

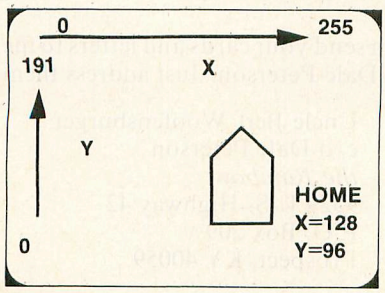
TO PENTAGON2 :N
  REPEAT 5 (FD :N RT 72)
  END
```

Then, I thought about the angles of turtle-turning that would be involved when triangles are stacked around a pentagon, and came up with this star:

```
TO STAR :N
  RT 30
  REPEAT 5
  (FD :N RT 120 FD :N LT 48)
  END
```

And I tried various values for :N, including 10, 20, 35 and 50.

My star was always starting at home position, which was all right, I suppose. But I wanted to try other positions on the screen. Now, in the past when I've wanted to start a drawing at a position other than the home position, I've always just snuck the turtle over by telling it to PENUP (PU), then move over, then PENDOWN (PD). But, I've recently discovered a new way. Apparently, positions on the Color Computer's screen can be described by numbers. There are X numbers, which describe locations widthwise across the screen. Then there are Y numbers, which describe locations up-and-down-wise on the screen. With Color LOGO, you can place the turtle anywhere on the screen by specifying the X and Y locations you want, using the following commands: SETX and SETY. It seems that you can choose your X locations with numbers from 0 to 255, and your Y locations with numbers from 0 to 11. The turtle's "home" is in the middle of all that, at a position where X equals 128 and Y equals 96.



Anyhow, I decided to try a star that was just a little higher than the home position (thus using a SETY that was greater than 96). Did I mention that the abbreviations for SETX and SETY are SX and SY?

```
TO STAR1 :N
  SY 120
  REPEAT 5
  (FD :N RT 120 FD :N LT 48)
  END
```

Then I said to myself, "What the heck — if the number of a side length can be a variable, why can't my X and Y values?" So I tried that.

```
TO STAR2 :N :X :Y
  PC 1
  SETX :X SETY :Y
  REPEAT 5
  (FD :N RT 120 FD :N LT 48)
  END
```

Next, I tried my usual fancy-dancy variations.

```
TO STARSTAR :N
  SY 120
  REPEAT 5
  (PC 1 FD :N RT 120
  PC 2 FD :N LT 48)
  END

TO STARSTAR2 :N
  REPEAT 50 (STARSTAR :N RT 1)
  END
```

I didn't really like STARSTAR2 :N very much. I had been hoping for a kind of star-circling effect, something neat and symmetrical. I thought about what was happening and realized the trouble was that my star was always beginning at a "valley" on the star's edge, and that beginning position was making everything mush up. So I decided to start my star from a tip and then try to spin it around. Thus, I did this:

```
TO STAR3 :N
  FD :N
  REPEAT 4
  (LT 48 FD :N RT 120 FD :N)
  LT 48 FD :N RT 120
  END

TO STARCIRCLE :N
  REPEAT 20
  (PC 1 STAR3 :N RT 18)
  END
```

I picked the number 20 at random, thinking that would look nice. The RT 18 arose because I wanted the repeating star to fill a whole circle (18 times 20 brings us all the way around to 360). Thinking about that I realized I might make effective use of a second variable for the number of times the pattern repeated.

```
TO STARCIRCLE2 :N :T
  REPEAT :T
  (PC 1 STAR3 :N RT 360/:T)
  END
```

I decided to get fancier:

```
TO STARCIRCLE3 :N :T
  REPEAT :T/2
  (PC 1 STAR3 :N RT 360/:T
  PC 2 STAR3 :N RT 360/:T)
  END
```

And fancier:

```
TO STARCIRCLE4 :N :T
```

```
MAKE :M :N/2
STARCIRCLE3 :N :T
REPEAT 3 (PC 0 STAR3 :M RT 120)
END
```

Next, I thought it might be nice to build a star that would fill itself in. One possible way to do it might be to run the star outline procedure (TO STAR3 :N), and keep reducing the value of :N. How do we reduce the value of :N? We could run STAR3 several times, and each time specify the value of :N by typing it out. But that means too much typing for Uncle Bert. Fortunately, there is an easier way, and it has to do with the MAKE statement. The MAKE statement allows us to include variables internally within a procedure, and change them automatically, as part of the procedure. Not clear? Let's try it:

```
TO STARFILL
  MAKE :N 25
  REPEAT 25 (STAR3 :N
  RT 30 FD 1 LT 30
  MAKE :N :N-1
  END
```

Neat, huh? I like the way the size of :N diminishes automatically in the procedure. For various reasons beyond our control, that did not completely fill the star. So, we'll keep that procedure and then sneak along the edge of the star and do it again from one of the other tips. Like so:

```
TO STARFILL2
  STARFILL
  HOME
  REPEAT 3
  (FD 25 LT 48 FD 25 RT 120)
  STARFILL
  END
```

Not perfect, but good enough for me. No, I'll give the whole thing a better color, and tilt it:

```
TO STARFILL3
  RT 5 PC 1
  STARFILL
  HOME RT 5 PC 1
  REPEAT 3
  (FD 25 LT 48 FD 25 RT 120)
  STARFILL
  END
```

Notice that I have to specify pencolor after HOME. The HOME seems to cancel previous conditions, including pencolor. No, to make my filled star really mobile, I ought to introduce variables for position. Like so:

```
TO STARFILL4 :X :Y
  SX :X SY :Y
  RT 5 PC 2
  STARFILL
  SH 0 SX :X SY :Y
  RT 5
  REPEAT 3
  (FD 25 LT 48 FD 25 RT 120)
  STARFILL
  END
```

I put in the SH 0 (SETHEADING 0) just to make sure my turtle was pointing straight up before I went into the rest of the procedure. Try that one, with various values for :X and :Y. All right — enough pussyfooting on little cat feet, as the poet says! So, try this:

```
TO FIELD
  HT PC 1
  MAKE :Y 191
  REPEAT 88 (SX 0 SY :Y)
  RT 90 FD 100 LT 90
  MAKE :Y :Y-1)
  END

TO STARINFIELD
  FIELD
  MAKE :X 28 MAKE :Y 114
  STARFILL4 :X :Y
  END
```

That gives a red star in a blue field. To avoid serious misunderstandings at the international level, go back to the STARFILL4 :X :Y procedure, and change the pencolor to 3. You may also want to experiment with the PCs in FIELD and in STRIPE and STRIPE2, and with COLORSET, to get the proper and patriotic blue and red. Now:

```
TO STRIPE
  SH 0
  MAKE :Y 191
  REPEAT 2 (PC 2 REPEAT 22
  (SX 101 SY :Y
  RT 90 FD 154 LT 90
  MAKE :Y :Y-1)
  PC 3 REPEAT 22
  (SX 101 SY :Y
  RT 90 FD 154 LT 90
  MAKE :Y :Y-1))
  END

TO STRIPE2
  MAKE :Y 103
  REPEAT 2 (PC 2 REPEAT 22
  (SX 0 SY :Y
  RT 90 FD 255 LT 90
  MAKE :Y :Y-1)
  PC 3 REPEAT 22
  (SX 0 SY :Y
  RT 90 FD 255 LT 90
  MAKE :Y :Y-1))
  END

TO STARNSTRIPES
  STARINFIELD
  STRIPE
  STRIPE2
  END
```

All we need is music! I remain,

— Uncle Bert

P.S. You can send your cards and letters to me in care of my good friend Dale Peterson. Just address them like this:

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c/o Dale Peterson
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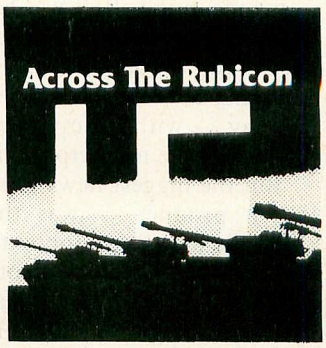

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PRINT #-2, *(continued from p. 14)*

It seemed like every time I was turning around last month someone in the office was handing me an airplane ticket for someplace. The highlight of the month was a trip to Las Vegas for the COMDEX show. It was somewhat disappointing in that there were so many "new" computers on display — with, to my mind, no chance that they will all survive in the marketplace in the coming year.

But the biggest news of the show — or the most-talked-about product — was the new IBM PC*jr.* computer. Frankly, it was a disappointment for me. My feeling is that it is priced too high, does not have the gloss of the IBM PC, and may have rushed ahead to get into an under-$1,000 market. It barely makes it into that category and I, for one, think it will be a real test of whether the American public will buy a computer for the capabilities or the "name."

I also took a few days to attend the World of Commodore show in Toronto, and was pleased to see several of our Canadian friends who were, as I was, checking out another market.

What impressed me most about the show was the attempt by Commodore to absolutely dominate their computer's market. Radio Shack has always had a bad rap — usually from one source which will go herein unnamed — for being "closed" to the third party market. If anyone wants to pin that rap on Radio Shack today, they should look at Commodore.

Come to a **RAINBOWfest** and you will see a variety of printers, modems, disk drives and the like. Certainly, Radio Shack equipment seems to predominate — but part of that reason, I firmly believe, is because firms which manufacture disk drives and printers do not actively market to the CoCo (see, for example, the number of such manufacturers who *directly* advertise on these pages).

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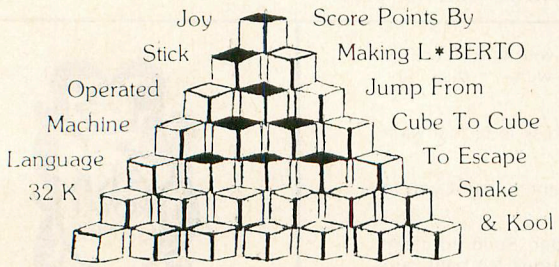

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Yet, in Toronto, what I saw were Commodore disk drives, Commodore printers, Commodore monitors. Heck, there were even two Commodore company magazines. And the magazines do not accept advertisements from third parties.

What I am saying is that Commodore really tries to dominate its market. And, I believe, one of the reasons CoCo has been so successful is because of the participation of third party vendors in the market. My opinion is that this is a forward-looking approach on Tandy's part and that they don't deserve the bum rap that some people try to pin on them.

By the way, I think, too, that the dominance of Commodore in its own market very badly hurts what some call "kitchen table software" firms. If you have to compete directly with the people who make the computer, you have to have a certain "bigness" about you. I know lots of people who started up in the CoCo market on a shoestring (*the Rainbow* included) and I still believe the Color Computer offers an opportunity for good old incentive, no matter how small you may be.

It would be unfair for me to mention the Commodore show without mentioning the warm-hearted people of that fine city. In three days north of the border, I did not encounter a single person who was not a first-class representative of a wonderful country. From the guard at customs to the taxi drivers (who I *think* I convinced to buy a CoCo), everyone I met or spoke to was warm, friendly, helpful and, as we say here in the south, "good folks."

You have no doubt read things I have to say about Radio Shack from time to time that have been very positive. Well, I suppose you should know that those are not just words.

From the beginning, we have used Radio Shack equipment in the business end of *the Rainbow* as well as the publication end. We do that because we have a very good feeling for the reliability of the equipment and, too, because we don't feel we have to be programmers to make it work. We use Color Computers for a variety of things besides just publication of *the Rainbow* and its sister computer magazine, *PCM — The Portable Computing Magazine.*

As an example, we are able to use Color Computers to typeset copy for the magazines through our typesetting equipment and, in the case of another publication, *SCORECARD*, a sports weekly, we use Portable Computers to do statistics and write game stories.

We have a Radio Shack telephone system which works very well and we have historically used Model IIs, 12s and 16s for our subscription service, general accounting and the like.

Just this past month we took another step, and began conversion to a multi-user environment for subscription service on the new Xenix software from Radio Shack. One of the prime reasons for that decision was the ease of converting our present subscription data files from single-user Model 16 to Xenix. It means faster answers to your subscription queries, for one thing. And it also means that now we can have more than one person entering new subscriptions (or updating renewals) at a time. We've been growing very rapidly, and the need for this single feature has become a must. By the way, if your subscription label last month was a little bit different (perhaps no expiration date) blame it on the dummy (me) who forgot to put it on. It is fixed now.

I guess what I am saying is that you often read here about how good I think this or that at Radio Shack is. We don't just say it at *the Rainbow*, we believe it and practice that same philosophy.

—Lonnie Falk

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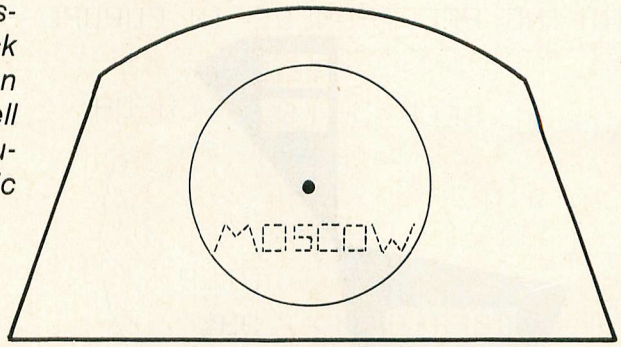
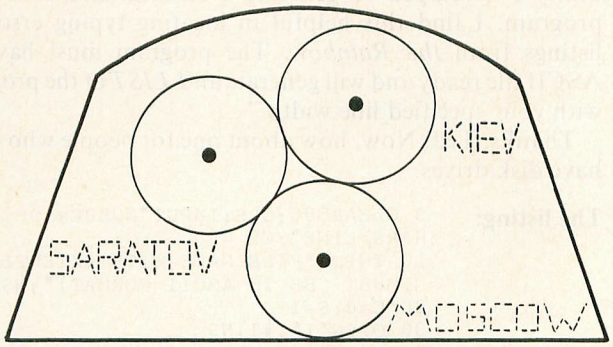


Expanded Map View



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A Teeny *Tinydump*

By Dave Anthony

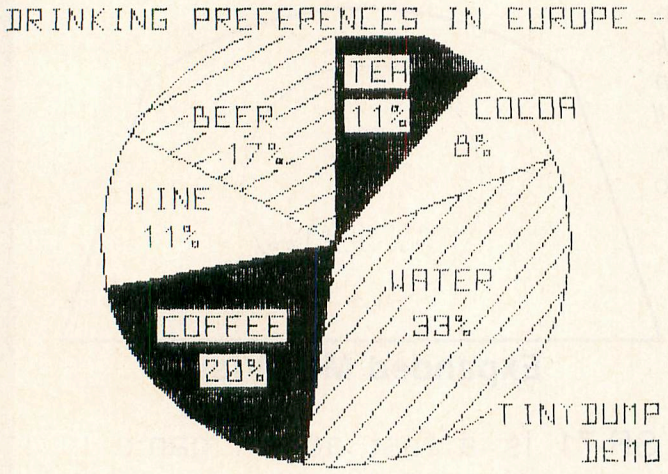
Here is a 2-line program which will dump *PMODE 0, 2* and *4* graphics to a DMP-100 printer. I wrote this program when I was unable to find one elsewhere that would print one dot per screen point. The program gives a small picture, which helps to overcome CoCo's low pixel resolution, hence, the name *Tinydump*.

Being in BASIC, it can take a good deal of time to print one screen. However, it is simple and relatively easy for an intermediate CoCo programmer to understand.

Since a hi-speed poke is used, CoCo should be set to output at 600 Baud, which will effectively be 1200 Baud. The printer should be at 1200 Baud.

Tinydump is a poor person's screen dump, requiring Extended BASIC and the least expensive printer Radio Shack makes.

Here is an example of *Tinydump*:



The listing:

```
10 SCREEN1,0:POKE65495,0:FORY=1T
04:PRINT#-2,CHR$(18):NEXTY:FORY=
0TO191STEP7:PRINT#-2,CHR$(27);CH
R$(16);CHR$(0);CHR$(112);:FORX=0
TO255:G=128:FORC=0TO6:IFY+C<192A
NDPPOINT(X,Y+C)THENG=G+2^C
20 NEXTC:PRINT#-2,CHR$(G);:NEXTX
:PRINT#-2,CHR$(13);:NEXTY:PRINT#
-2,CHR$(30)
```

CORRECTIONS

David C. Owen tells us that we made an error in illustrating his article, "Build An RS-232 Device Select Switch For Under $20" (December 1983). On page 204, the template in the upper right corner shows locations for holes to be drilled. These are not properly centered. All markings should be made along a horizontal center line, which would raise them a bit from where they are shown in the illustration.

In Richard S. Ellis' article, "Install Your Own Disk Drive 'On/Off' Indicator" (November 1983), instruction number three was inadvertently omitted. It should read:

3) Refer again to the attached picture and find the 0V strip [ground]. Solder a black wire (prestripped on both ends) at the point indicated. You will find another hole in the board here.

A clarification rather than a correction needs to be made concerning Joseph Kolar's article, "Flaunt Your CoCo With Season's Greetings Cards" (December 1983). While this novel program performs as indicated, you need to have a printer with a "bit-image" graphics capability and a screen print program that matches your printer in order to get printed copies of the cards. Good luck with St. Valentine's Day!

Hint . . .

Format Your Printouts With This Disk Utility

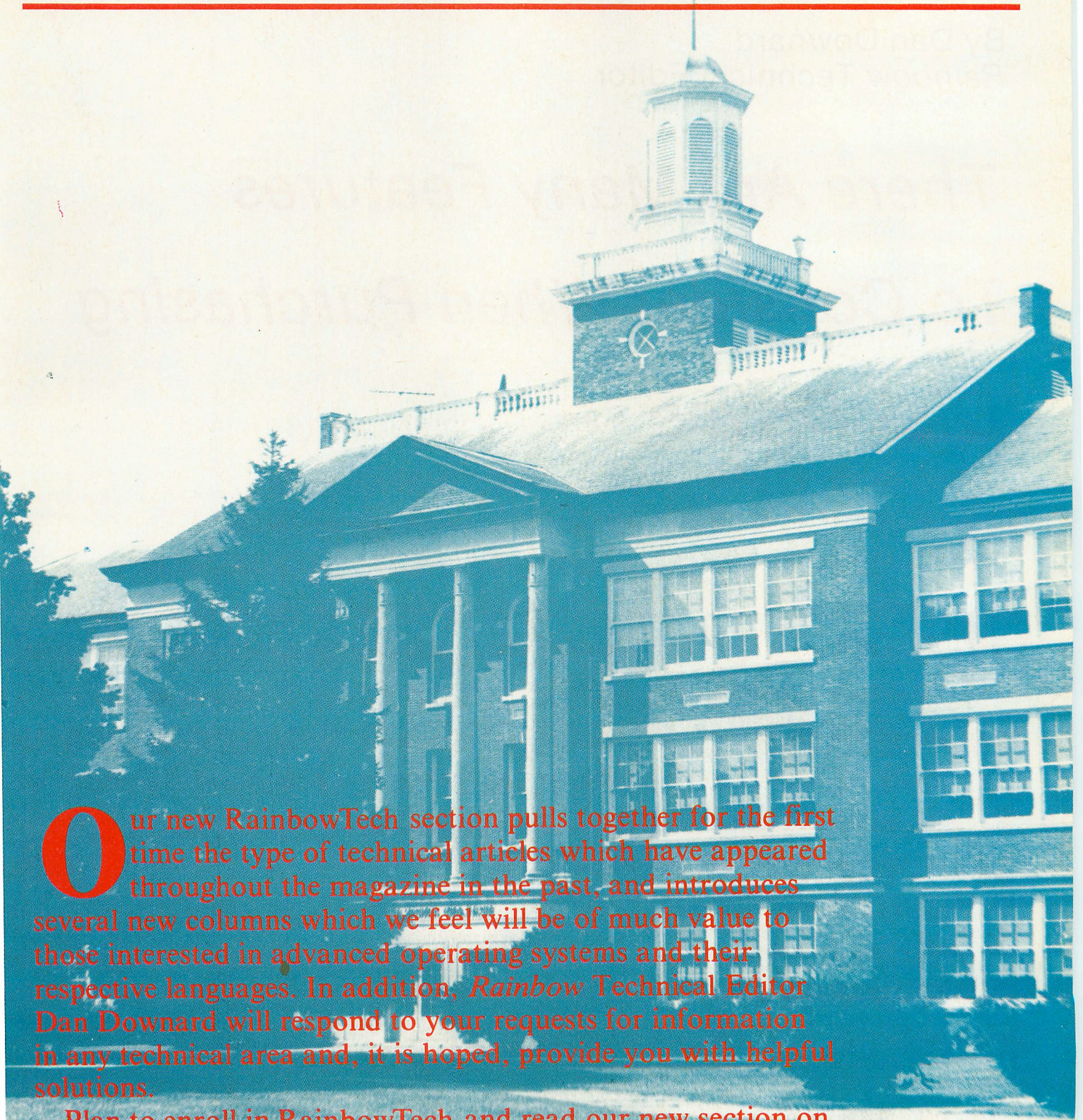
Ted Cizadlo Selig, of Omaha, Neb., writes that this is "a utility I developed to generate a 32-column *LLIST* of a program. I find this helpful in locating typing errors in listings from *the Rainbow*. The program must have an ASCII file ready and will generate an *LLIST* of the program with your specified line width."

Thanks, Ted! Now, how about one for people who don't have disk drives.

The listing:

```
5 CLEAR500:CLS:INPUT"NUMBER OF C
HARS/LINE";CL
10 INPUT"FILE NAME WITH EXTENTIO
N(MUST  BE IN ASCII FORMAT)";N$
20 C=0:F=1
30 OPEN"I",#1,N$
50 LINEINPUT #1,A$
60 IF EOF(1)=-1THEN F=0
70 X=LEN(A$)
75 IF X<=CL THEN 150 ELSE IF X=0
 THEN 50
90 N=1
100 FOR J=1 TO INT(X/CL+1)
110 PRINT#-2,MID$(A$,N,CL):C=C+1
120 N=N+CL
130 NEXT J
140 IF F THEN 50 ELSE CLOSE#1:EN
D
150 PRINT#-2,A$:C=C+1:IF F THEN
160 ELSE CLOSE#1:END
160 GOTO 50
170 CLOSE#1:END
```

RAINBOWTECH



Our new RainbowTech section pulls together for the first time the type of technical articles which have appeared throughout the magazine in the past, and introduces several new columns which we feel will be of much value to those interested in advanced operating systems and their respective languages. In addition, *Rainbow* Technical Editor Dan Downard will respond to your requests for information in any technical area and, it is hoped, provide you with helpful solutions.

Plan to enroll in RainbowTech and read our new section on a regular monthly basis. It's as easy as turning over this new leaf.

By Dan Downard
Rainbow Technical Editor

There Are Many Features To Consider When Purchasing Disk Drives

Would you please have someone run a comparative review on disk drives available to the CoCo?
Steve Hewitt
Leeton, MO

The choice of disk drives is a toss-up for the CoCo, Steve. Without getting into specific brand names we can give you some things to look for:

Two characteristics, which are very important for drive selection, are the number of tracks and the track-to-track access time. The standard Radio Shack drive is capable of 37 tracks (even though only 35 are normally used) and has a track-to-track access time of 30 milli-seconds. Sounds pretty fast, doesn't it? Disk Extended BASIC assumes you are using this type of drive and the software is based on these values. As the software is in ROM, it cannot be changed.

Other disk drives on the market are capable of 40, and even 80 tracks, and have access times of as low as 6 milli-seconds. These drives will work with Disk BASIC. You can only use 35 tracks and 30 milli-second access though due to Disk BASIC.

Then there are DOSes (Disk Operating Systems) for the CoCo. The three most common are FLEX, STAR-DOS and OS-9. These DOSes allow a variable number of tracks and different track-to-track access times. When using a true DOS on the CoCo disk, access frequency is far greater. As each program is loaded only when necessary, it becomes important to have fast disk access times. Obviously, the number of tracks is proportional to the storage capacity of the disk. The more the merrier. From a storage capacity standpoint you are far better off with 40 tracks.

There are other considerations too, such as price. Beware of the bare drives advertised in some trade publications. That is exactly what you get: No power supply, no case, or no controller. When you buy a Radio Shack Drive 0, all you have to do is plug it in and you're in business. Other drives will require a controller and cable.

Taking all of the above into consideration, I would recommend that the average user buy a Radio Shack drive. If you are confident you can handle the interfacing, there are other drives on the market that are faster and have more storage capacity. Keep in mind that to utilize these features you have to be running a DOS. We understand that one company now makes a controller that is compatible with Disk BASIC and allows you to reconfigure your disk drive without a DOS, but this controller has not been reviewed. Good luck.

(Dan Downard is an electrical engineer and has been involved in electronics for 24 years through ham radio [K4KWT]. His interest in computers began about five years ago and he has built several 68XX systems.)

CoCo Amnesia

• *Using the instructions in the June 1983 edition of* Rainbow, *I extended my 16K "285" ECB. I put 64K chips in it. Now, when I "?MEM" I get 24871. A* POKE 25,6:NEW *will raise the memory to 31015, but that's it. Is there a modification I must make to my 285 board to get the memory up closer to 64K? Or, what do I have to type in to get it?*
Ron Hestand
Radcliff, KY

There is nothing wrong with your computer, Ron. You already have 64K of RAM, but you have to know how to use it. There are two things you must understand, the difference between RAM and ROM, and the memory map of your CoCo.

Even if you have 64K chips installed, when you turn on your computer it is initialized such that the lower 32K, or $0000-$7FFF, is configured as RAM and the top 32K, or $8000-$FFFF, is configured as ROM. Since Extended BASIC does a *PCLEAR-4* and *CLEAR200* on startup, you have 24871 bytes left for BASIC programs. This is normal. The *POKE25,6* statement you refer to is actually a *PCLEAR0* and gives you 6K of additional memory, if you don't require memory for graphics.

How do I use the upper part of the 64K RAMs? There are several schemes of using some of this memory. One particularly popular way is to move BASIC from ROM to RAM, and then relocate BASIC. With this method, programs of up to 40K are possible. If you want to try this see Jorge Mir's article "Using The Upper RAM of Your 64K" in October's *Rainbow*. Using the upper 64K of memory is not automatic and requires some imagination. Some other common uses for this "unused" memory are high resolution screens, data storage and printer spooling.

Use Your Chips Wisely

•I have a TP-10 printer but can't get it to work properly. It isn't the printer, it works fine on another Color Computer. It isn't my RS232 port. I ran the Radio Shack Diagnostic ROM Pack RS232 test and it tested okay. The only other thing I could think of was that I upgraded my D board from it's original 4K to it's present 32K by piggybacking the RAM chips.

My mind flashed back to a letter to the editor in the October issue of Rainbow. *His problem was with "color script." You said that piggybacking RAM chips produces "memory overlay" that produces havoc with certain software. Could this "memory overlay" be the problem with my printer also? If so maybe someone knows of a poke that would solve the problem.*

Joe Hadley
Ft. Ord, CA

Joe, when you piggyback a set of 16K chips, pin 4 of the top set of chips is connected to pin 35 of the SAM chip. Pin 4 of the 4116-16K Dynamic RAM is the RAS line, or the row address strobe. Pin 35 of the SAM chip is MA7, or in the case of piggyback RAMs, RAS1.

What all of this means is that your addresses are not absolutely decoded and each byte appears twice in the memory map. Addresses $0000-$7FFF correspond to addresses $8000-$FFFF, what we normally call a memory overlay. For example, if you would examine address $0400 with a monitor, the byte value would correspond to the value at $8400.

Software associated with the printer routine polls the SAM and consequently the PIA chips for a printer busy signal at address $FF22, Bit 0. Since you have both RAM and the PIA chip at this address, a problem is created.

Our advice is to upgrade to 64K using 4164 chips. In addition to solving your problem, your computer will run cooler and you can make use of 64K software offering many new advantages.

A Talking Gorilla?

•I am writing in reference to Tony DiStefano's article on Page 230 in the November '83 issue. I have a Gorilla monitor and as you are aware, it doesn't have an audio output. The article shows how to hardwire a speaker and amp inside the computer, but I wanted to know if there was some device to be connected outside the computer, possibly using the present jack.

Scott Nelson
Atlanta, GA

Scott, the same circuit you are referring to in the November *Rainbow* could be installed in your monitor just as well as inside your computer. The only problem may be locating a source of 12 Volts DC.

Any audio amplifier will work with the CoCo. Just pick up the audio input from the point listed in the article. If you have trouble finding a source of voltage, try using a battery.

Same Language, Wrong Dialect

•When I bought my TRS-80 CoCo from a local Radio Shack Computer Center, the salesman told me that I could purchase an adapter so I would be able to use different cartridges with this CoCo. But, he never has been able to find this information. Is there, in fact, such an accessory for my CoCo? Can I purchase an adapter so my TRS-80 can use software designed for Atari or any other computer system?

Raymond Patrick
Niagara Falls, NY

I think you received some bad information, Ray. I assume you are referring to Atari cartridges. Since Atari uses a different microprocessor, the machine codes are not compatible. At the same time, I think just about every game written for the Atari is available for the CoCo. Just read the ads carefully.

A Dislocated Disk

•Several of my machine language programs load at HEX 600. *Disk BASIC also occupies some space at the same address. While I can get a disk copy by loading with an offset and then saving, the programs are apparently position dependent and cannot be relocated. The question then is — can that portion of Disk BASIC, which loads at* HEX 600, *be relocated elsewhere in RAM without crashing my system?*

Gary Leventhal
Latham, NY

Gary, the area above $0600 in Disk BASIC is reserved for disk buffers, the area of memory that is used to transfer information from disk to RAM. As far as we know, there is no way to relocate this area.

To solve your problem, you might try appending a short relocator program to the end of your game so that after it is loaded into its offset address from the disk, you move it back to its original location.

Your technical questions are welcomed. Please address them to: Downloads, *the Rainbow*, P.O.Box 209, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity.

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Design And Development Of Application Software

By Paul Searby

Since this is the first time an article by me is appearing in *the Rainbow*, I will first take a moment to give you a brief summary of my background. I have been involved with computers and data processing since 1969, working primarily on larger IBM systems until 1977. During that time, I was primarily involved in the design and development of both financial and manufacturing applications. In October of 1975, I bought, built and programmed the first "personal computer" ever made. It was an Altair 8800 that came in kit form with 1K of memory. Then in March 1976, Southwest Technical Products introduced their Motorola 6800 computer kit, and we immediately became one of their first dealers, operating a small store on a part-time basis. This particular computer is of some interest, because it is basically the great grandfather to the CoCo.

We were having some success with our small enterprise and, in October 1977, I quit my full time job as a Project Manager for a large corporation to devote full-time efforts to our company, Computerware®. It was at this time that we began development of the many system and application software products that are still being marketed today. In fact, today, not only do we provide a large number of products for the CoCo, but still support larger 6809 based systems. Many larger companies, such as Kaypro Corp., use the systems and applications products that we developed.

Although I have not personally programmed every one of the many application packages that we offer, I have always been involved in the design and development. What I have had is an opportunity to see the evolution of a particular series of programs over a period of more than six years, seeing where they did well and where problems occurred. That brings us to the purpose of these articles.

What I will try to do is to cover in fair detail the steps which should be taken in the process of designing and developing a major application. Although the articles should be of interest to most people, they will be oriented toward the designer and programmer (often one and the same). It will be assumed that this person is not necessarily going to be the user and thus the additional responsibility of ease of use will be ours.

As I discuss our design and programming objectives, you will get the feeling that it is oriented toward a person doing this for commercial purpose, not you doing it for yourself. While that may be the case, I would like to point out that it is from that perspective that better design and programming habits are developed. Today you think that you are writing it for your own personal needs. However, if it is well done and appears to serve a common need, wouldn't it be nice to financially reap a reward for your efforts?

The design and programming will be based on the features, capabilities and limitations of Computerware® *Random BASIC*, which is available for the CoCo on both the FLEX and OS-9 operating systems. As we go, specific examples from existing application programs ill be included. However, the reader can use the ideas shown here with almost any other language. As will be mentioned several times in the articles, application software is more often requiring modification than other types of software. Thus, it is a good idea to use a higher level language, which generally makes minor modifications easier to perform.

Although one of the ground rules for these articles was that I will not provide extensive "hand holding," ie, oversimplify, it will be helpful from the onset to provide an overview of the types of software and the characteristics of each in relation to our subject of application software design and development. Basically there are two general categories for software: system software and application software. *System* software is typically considered to be not only the operating system that you are using, but also, the languages (ie, BASIC, PASCAL, FORTRAN, C, etc.) and most utilities.

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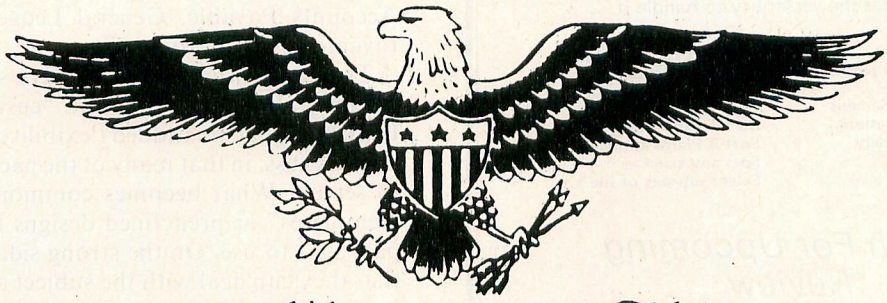

Color Micro Journal

The Color Computer Monthly Magazine

$1.95 per issue Vol. 1, Issue 2 October, 1983

THIS 'N THAT

The **BIG NEWS** this month is that **OS-9** has finally arrived for the Color Computer. The **ASTOUNDING** part of the Radio Shack OS-9 Package, besides the price, is the **DOCUMENTATION.** You 'Old Time Radio Shack Followers' will not believe what you see. Jon Shirley has been telling us that the main reason for the "lack" of documentation with a lot of their products was the restrictions placed on releasing that information by **Microsoft**; I

OS-9 on the COLOR COMPUTER

One of the "Operating Systems of the Future" is **now available** for the "little old Color Computer"; **OS-9**. Freely translated, OS-9 means "**O**perating **S**ystem for the 6809" (OS-9 is now being written for the **68000**, also). Since it is fairly obvious that UNIX and "UNIX-Type" Operating Systems will be running on just about every computer to come out in the next few years, a whole new language is beginning to appear on the horizon.

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System software may or may not be flexible to use, but in either case, it is not often subject to change. As with the CoCo, BASIC is in ROM format, which does make it a little difficult to modify. Instead of modifying system software, usually a deficiency is overcome by someone writing a utility that provides the needed feature.

The other category, application software, is split into two areas: generalized packages and specialized packages. For the purpose of this discussion, we will consider data base programs, calculator programs, word processing, etc., to be in the generalized area. The specific area would include many financial packages such as Accounts Receivable, Accounts Payable, General Ledger, Payroll, along with Inventory, Job Costing, etc.

The generalized packages have strengths in being more flexible, alowing the user to "customize" to their needs. Unfortunately, this added flexibility also brings with it areas of weakness, in that many of the packages are more difficult to set up. What becomes common is the sale of specific "templates" or predefined designs for the general purpose packages to use. On the strong side of specific packages is that they can deal with the subject at hand in greater detail

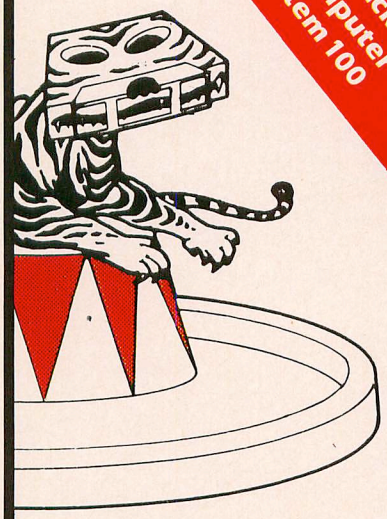
"[Accountability] . . . is valuable from two points of view: it is quite helpful in debugging the programs, and it gives the user some of the checks and balances that are required in financial applications."

and, in most cases, are quite easy to use. They can include complex file structures that just aren't avalable with the generalized programs. However, one of their major shortcomings is that, in most cases, a programmer is required to make any changes. The amount of expense involved will be determined by not only the complexity of the changes, but also how well the programs and system was designed. This brings us back to what these articles are all about. . . .

The last area of discussion in this month's article will be an overview of design criteria. Not particularly listed in their order of importance, the following are our major design criteria: "maintainability"/modifiability, ease of use, accountability, and target system capabilities. Regarding maintainability and modifiability, in the real world, many businesses have unique needs in the area of computer software requirements. Many of them can be satisfied with generalized application packages, however, others require features that can't be accomplished with a generalized package. So, we look for software that is specific to the needs of the user.

The typical situation is one where we find something very close, but not quite right. Assuming this from the beginning, we should design maintainability and modifiability into our programs. I adhere to the "KISS" philosophy: (K)eep (I)t (S)imple, (S)tupid! We want to design simple "black box" modules that can be common to any programming, not only in our modules, but also in our mainline. This will cost us some space, and so will good variable names and comments when required, but it can save us many, many hours of

Radio Shack Color Computer TDP System 100



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debugging. This time savings isn't just at programming time, but also six months down the road when we again have to understand what we did. We will also want to put a lot of thought into the file structure before we even come near the programming stage. More on this later.

As was mentioned earlier, we will assume the responsibility for ease of use. We may not even know who is using the software, and definitely do not want to spend time on the phone with each user to get them up and running. This is bad from a public relations point of view, and also means that valuable programming or marketing resources are tied up not doing what they should be doing. Going one further, we will assume that even though we will have a good manual, most users don't really read the manual as completely as they should. This isn't a slight on users, it's a realistic observation made over the past six years. Therefore, we want to use easy selection menus and provide as much guidance as possible within the programs.

As to accountability, this means that the software should provide some form of an audit trail. Can we trace what happened? This is valuable from two points of view: it is quite helpful in debugging the programs, and it gives the user some of the checks and balances that are required in financial applications. In this same area, the software must comply with accepted practices. If in the financial area, it must not only be accurate, and provide a method of balancing, but should in most cases, not allow the user to get it "out of balance."

Lastly, target system capabilities must be taken into consideration. If the vast majority of users have only 16K cassette-based systems, designing for a quad-drive 64K computer may not be where it's at. You are better off to re-think the desired capabilities and come up with ones that will fit the systems of today, *but* designed for easy expansion in the future.

In the next article, we will get into more depth on our design, along with exploring the use of top down design as a tool to improve our design objectives.

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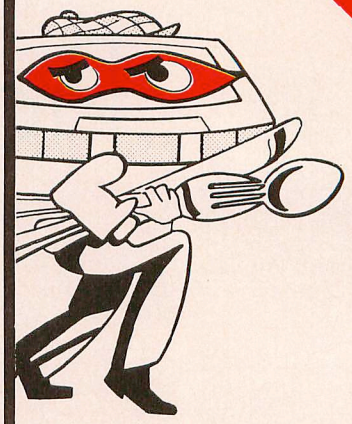

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Prospecting The MC-10

By H. Allen Curtis

This article, like that of Tom Szlucha in the September issue of *the Rainbow*, deals with the hidden commands of the MC-10. Tom, in his article, lamented the MC-10's lack of a *CSAVEM* command. To offset this deficiency, I am presenting herein a short program simulating such a command. My article was written to act as an addendum to the MC-10 manual.

There's gold to be found in the ROM of the MC-10 computer. Some prospecting with *PEEK*s reveals three tables—a table of BASIC key words, a table of entry addresses to ROM subroutines for each of the BASIC statements of MC-10, and a similar address table for the BASIC functions. These tables can be found at ROM addresses 57413-57670, 57672-57737 and 57344-57391, respectively. The information contained in those tables are recorded and consolidated in Tables 1, 2, and 3.

Table 1 contains the BASIC key words of BASIC statements along with their associated ROM routine entry addresses and tokens. The addresses and tokens are given in both decimal and hexadecimal notations. A token is a single byte that represents the key word when it is stored in the BASIC program.

Table 2 contains the BASIC functions, their ROM entry addresses and tokens.

Table 3 contains logical operators, arithmetic operators and BASIC words having no ROM routines of their own.

(H. Allen Curtis, who earned degrees from the College of William and Mary, M.I.T., and Harvard, recently won an award for meritorious service from the IEEE Computer Society. He has had published a college reference book in the computer science field as well as many papers and articles.)

TABLE 1

	DECIMAL		HEX	
WORD	ADDRESS	TOKEN	ADDRESS	TOKEN
FOR	58564	128	E4C4	80
GOTO	58906	129	E61A	81
GOSUB	58884	130	E604	82
REM	59013	131	E685	83
IF	58994	132	E672	84
DATA	58961	133	E651	85
PRINT	59167	134	E71F	86
ON	59026	135	E692	87
INPUT	59358	136	E7DE	88
END	58751	137	E57F	89
NEXT	59579	138	E8BB	8A
DIM	60178	139	EB12	8B
READ	59406	140	E80E	8C
LET	59091	141	E6D3	8D
RUN	58874	142	E5FA	8E
RESTORE	58720	143	E560	8F
RETURN	58929	144	E631	90
STOP	58750	145	E57E	91
POKE	61286	146	EF66	92
CONT	58790	147	E5A6	93
LIST	58381	148	E40D	94
CLEAR	58808	149	E5B8	95
NEW	58317	150	E3CD	96
CLOAD	64860	151	FD5C	97
CSAVE	64571	152	FC3B	98
LLIST	58379	153	E40B	99
LPRINT	59164	154	E71C	9A
SET	64293	155	FB25	9B
RESET	64341	156	FB55	9C
CLS	64447	157	FBBF	9D
SOUND	65445	158	FFA5	9E
EXEC	65516	159	FC04	9F
SKIPF	65071	160	FE2F	A0

TABLE 2

	DECIMAL		HEX	
WORD	ADDRESS	TOKEN	ADDRESS	TOKEN
SGN	62138	177	F2BA	B1
INT	62261	178	F335	B2
ABS	62165	179	F2D5	B3
USR	16917	180	4215	B4
RND	63018	181	F62A	B5
SQR	62797	182	F54D	B6
LOG	61625	183	F0B9	B7
EXP	62921	184	F5C9	B8
SIN	63116	185	F68C	B9
COS	63110	186	F686	BA
TAN	63186	187	F6D2	BB
PEEK	61279	188	EF5F	BC
LEN	61058	189	EE82	BD
STR$	60653	190	ECED	BE
VAL	61212	191	EF1C	BF
ASC	61090	192	EEA2	C0
CHR$	61070	193	EE8E	C1
LEFT$	61101	194	EEAD	C2
RIGHT$	61128	195	EEC8	C3
MID$	61135	196	EECF	C4
POINT	64412	197	FB9C	C5
VARPTR	64529	198	FC11	C6
INKEY$	64493	199	FBED	C7
MEM	60635	200	ECDB	C8

TABLE 3

WORD	DEC TOKEN	HEX TOKEN
TAB(	161	A1
TO	162	A2
THEN	163	A3
NOT	164	A4
STEP	165	A5
OFF	166	A6
+	167	A7
-	168	A8
*	169	A9
/	170	AA
↑	171	AB
AND	172	AC
OR	173	AD

There is some gold dust in Table 3: The appearance of [↑] among the arithmetic operators indicates accurately that the MC-10 has the previously undocumented ability to raise numbers to powers. However, heavy gold nuggets are found in Tables 1 and 2. Table 1 shows the existence of the *EXEC* command, a command not mentioned in the MC-10 manual. Table 2 reveals that there are two functions, USR and VARPTR, that are also unmentioned in the manual.

The three uncovered nuggets provide convenient means of accessing machine-language routines and programs. Finding the three nuggets made me suspect that there might be more gold hidden in some of the commands described in the manual. Maybe some of their features were left undescribed. My suspicions were soon confirmed. I found that appending the suffix M to *CLOAD* produces a variant of that command that will load machine language programs. Moreover, the *CLEAR* command has facilities for protecting memory space at the high address portion of the RAM, where machine-language routines can be *POKEd*.

Unfortunately, the MC-10 has no *CSAVEM* command to record machine-language programs on tape. To remedy this deficiency I have written a program that will simulate a *CSAVEM* command. The presentation of this program will be used to illustrate how the *CLEAR* and *EXEC* are used.

Before the presentation is made, it is worthwhile interjecting some remarks about machine language programs and BASIC programs using machine language routines. Sooner or later you will probably encounter problems whose solutions require programs that must execute with speeds and economy of memory usage which cannot be achieved with BASIC alone. Machine language programs can provide maximum execution speeds and memory economy. However, such programs are usually complex and much more difficult to write and debug (locate programming errors). Often the best solution is a BASIC program with a few strategically chosen machine language routines. Such a program combines the simplicity of BASIC and the speed and economy of machine language.

It is hoped that this article will stimulate the use of machine language programming. Writing machine language programs and routines requires familiarity with assembly language programming and the 6803 microprocessor's instruction set. Towards gaining this familiarity, it is suggested that you read "BASIC Microprocessors and the 6800," Ron Bishop, Hayden Book Co., 1979.

In Listing 1 is shown the program for saving machine language programs. Using the *CLEAR* command, the program protects the final 53 bytes of the MC-10 RAM. Then it *POKEs* 53 bytes comprising the machine language program into the protected memory area. This memory area is protected in the sense that the memory areas for the BASIC program, its associated variables, and the BASIC stack will not encroach on the protected RAM. After the machine language program is *POKEd* into high RAM, the *EXEC* command provides a means of entry from BASIC to the machine language program.

In line 10 of Listing 1, the first address of the protected memory area is calculated. The number, 256*PEEK(16976), is the highest RAM address minus 255. The address given by X in line 10 is 20427 for a 4K byte RAM or 36811 for a 20K byte RAM. In line 20 CLEAR100, X-1 reserves 100 bytes of string memory and protects all memory beyond X-1. The *CLEAR* command also initializes all variables. Hence, the first address of the protected RAM, which also happens to be the entry address of the machine language program, must be recalculated in line 30.

Line 70 is included to prevent the execution of the machine language program when one or more of the *DATA* statements of lines 90 through 170 have been typed incorrectly. In line 80 EXEC X initiates the execution of the machine language program at the entry address X.

When you have keyed in the program without any typing errors and run it, you will see a question mark (?) prompt and a flashing cursor. For the present, ignore the prompt and press [BREAK]. *CSAVE* the program on tape for future reference. Then rerun the program and answer the prompt by typing in decimal the first address of the program to be saved, then its last address, next its entry address, and finally a filename. The typing format is as shown in the REM of line 5. A comma must follow each address, and the filename must contain eight or less characters enclosed by quotes. The three addresses for the machine language pro-

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S K I L L W A R E

"Machine language routines that are integral parts of a BASIC *program can be stored in protected high RAM. However, frequently to reduce memory consumption it is convenient to store machine language routines in strings."*

gram now residing in the protected high RAM are 20427, 20479, and 20427, respectively, for a 4K RAM and 36811, 36863 and 36811, respectively, for a 20K RAM. *CSAVEM* is an appropriate filename for the program.

After typing the addresses and filename, pressing [ENTER] initiates the recording process. Therefore, before you press [ENTER], be sure that you have properly positioned your the tape and have depressed the record and play buttons of your recorder. If you make a typing mistake, you may get an error message instead of recording. In such a case, use *EXEC* again and repeat the process.

When you have a good recording of the program, *CSAVEM,* turn your computer off and then on again. Now with an empty RAM you can use the *CLOADM* command to test whether or not *CSAVEM* works properly. Before loading, protect the top of the RAM for *CSAVEM* by typing and entering the following:

```
CLEAR100,256*PEEK(16976)+202
```

Then type *CLOADM"CSAVEM"* if you rewind to the beginning of the tape, or merely use *CLOADM* if you position the tape between the two programs recorded. Then press [ENTER] and you should shortly get the OK prompt. To make entry to *CSAVEM*, merely type *EXEC* and press [ENTER]. *CLOADM* provides the entry address.

There is another interesting feature of the *CLOADM* command that has facilities which allow you to load a program in different portions of the RAM. Using *CLOADM* with the format — *CLOADM* "filename",n — where n is a decimal address offset, you can load the program into an area whose first address is n greater than the recorded first address of the program. To load the program into an area whose first address is n less than the recorded first address, you must use 65536-n instead of n.

To see how this feature works, try loading *CSAVEM* at a memory area from 19427 through 19479 for a 4K RAM or from 35811 through 35863 for a 20K RAM. Before loading, *PEEK* at the contents of 19427 or 35811 depending on the size of your RAM. That is, type and [ENTER] either: PRINT PEEK(19427) or PRINT PEEK(35811) respectively. Remember this number for future comparison with the contents of that address after loading. Position the tape for loading. Then type *CLOADM "CSAVEM",64536* and press [ENTER]. Depress the play button. After the OK prompt appears, *PEEK* at the contents of 19427 or 35811 again. If the address now contains 206, you have verification that the offset feature of the *CLOADM* command works as described. Entry can be made by means of *EXEC* as before.

This feature of *CLOADM* must be used with caution. The program to be loaded must be relocatable, that is, it must have the ability to execute properly regardless of its location in RAM. *CSAVEM* was purposely written to be relocatable for your convenience and the safe application of the *CLOADM* offset feature.

Machine language routines that are integral parts of a BASIC program can be stored in protected high RAM. However, frequently to reduce memory consumption it is convenient to store machine language routines in strings. Once a machine language routine is "packed" in a string, the *READ-DATA-POKE* sequence of instructions can be deleted from the BASIC program. These deletions can be safely made because the machine language routines are embedded in the BASIC program and will be loaded as a part of that program.

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The *VARPTR* function is often used to determine the first string address into which to *POKE* the machine language routine as well as to provide the entry address. The program of Listing 2 is the same as that of Listing 1 except for lines 10, 20 and 30. Therefore, load the previously saved program of Listing 1 and type in the new lines 10, 20 and 30.

The five sequences of 1234567890 followed by 123 in the string A$ of line 10 provide the needed space for the 53 byte machine language routine. If you type more or less than 53 characters into A$, then the program will stop at line 20. In line 20, B=VARPTR(A$) is the address containing the number corresponding to the length of string A$. In line 30, X is the address of the first character in the string A$.

When you have completed typing and entering lines 10, 20 and 30, run the program. Break out of the question mark prompt and notice how string A$ has changed in line 10. Don't worry, this colorful but unintelligible representation of the machine language program is correct. Delete lines 40 through 70 and lines 90 through 170. Now, you have a short BASIC version of the program to save machine language programs. Save it on tape.

It should be pointed out that strings may not be packed with any byte having a value 0 or 34. The ASCII code that is 0 provides the end of BASIC line signal, and 34 is the ASCII code for quotes. Note that *DATA* statements 90 through 170 did not contain any 0s or 34s.

The *EXEC* command is limited in scope compared with the *USR* function. The *USR* function not only provides means of entry to and exit from machine language routines, but also is the mechanism for passing information back and forth between the BASIC program and its machine language routines.

The program of Listing 3 is used to illustrate the workings of the *USR* function. The machine language routine is *POKEd* into the string A$ of line 10. The machine language routine performs the arithmetic function SQR(ABS(2* INT(N))) where N is a number that you enter in response to the *INPUT* statement of line 100. Ordinarily you would employ BASIC programming to perform the aforesaid arithmetic function. There is no real advantage doing it in machine language. The routine was written solely to illustrate *USR* function properties.

VARPTR is used to determine the address of the first character in the string A$. In line 30, M is the most significant byte of the first address of the machine language routine, L is the least significant byte of that two byte address. The first address of the routine is also its entry address.

In line 90 the two bytes of the entry address are *POKEd* into addresses 16918 and 16919. In Table 2 note that the entry address for the *USR* function is 16917, a RAM address. At 16917 is the operation code for the 6803 microprocessor's JUMP (JMP for short) instruction which is analogous to BASIC's *GOTO*. The *POKE*ing done in line 90 allows the *USR* function to make entry to the machine language routine.

The value of the variable N in the *USR* function of line 110 is the information that is passed from the BASIC program to the machine language routine. Each of the lines 130 through 170 contains a 6803 instruction which after the *READ-DATA-POKE* sequence is packed into the string A$. The 6803 instructions are usually represented in either hexadecimal or mnemonic forms rather than in decimal. Table 4 shows the five 6803 instructions of the machine language routine in their hexadecimal and mnemonic forms:

Table 4

Hex	Mnemonic
BD EB CA	JSR FACTOD
05	ASL D
BD EC E3	JSR DTOFAC
BD F2 D5	JSR ABS
7E F5 4D	JMP SQR

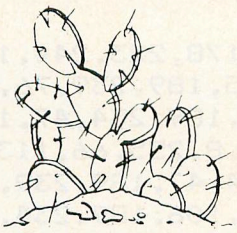
The mnemonic forms provide abbreviated descriptions of what the instructions do. Therefore, they are the easiest forms to use in programming. The JSR instruction, for instance, is analogous to BASIC's *GOSUB* command. JSR is a jump to a machine language subroutine. FACTOD in JSR FACTOD is a label assigned by the programmer to the entry address of the subroutines. The label describes what the subroutine does. In this case, the subroutine transfers the value of N from BASIC's floating point accumulator to the 6803 microprocessor's accumulator D. In the process of making the transfer the value of N is converted into an integer. The instruction ASL D does an arithmetic shift left one bit position of D, which is equivalent to multiplying the contents of D by two. JSR DTOFAC transfers the contents of D to FAC. JSR ABS makes the number in FAC positive. Note the address, F2D5, corresponding to the label ABS is precisely the entry address of the ROM routine for BASIC's ABS function given in Table 2. Finally, JMP SQR causes the square root of the contents of FAC to be taken and returns the result to BASIC. The address F54D corresponding to the label SQR is also found in Table 2. As you might suspect, Tables 1 and 2 furnish valuable information to the machine language programmer.

In general, the information passed from BASIC to a machine language routine is stored in FAC. When you wish to perform integer arithmetic on the passed information, you must transfer the contents of FAC to D. Hence, JSR FACTOD should be a very frequently used instruction. The final contents of FAC are the value that gets returned to BASIC. The final instruction used to exit from a machine language and return to BASIC is always RTS (Return from Subroutine and is 39 in hexadecimal form). This statement seemingly contradicts the fact that the machine language routine associated with the program of Listing 3 ends with JMP SQR. Each ROM subroutine is terminated with an RTS. Using JMP instead of JSR makes the SQR subroutines' RTS exit the return to BASIC exit.

It is hoped that you will manufacture many beautiful golden objects with the ore mined in this article.

Listing 1 (MC-10):

```
5 REM FIRST,LAST,START,"FILENAME
"
10 CLS:X=256*PEEK(16976)+203
20 CLEAR100,X-1
30 X=256*PEEK(16976)+203
40 FOR Z=X TO X+52
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW<>8373 THENPRINT"DATA ERRO
```



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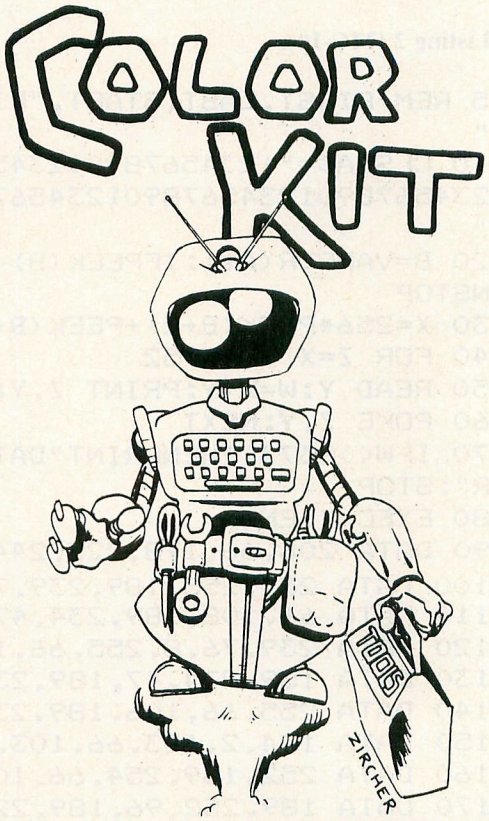

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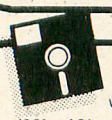

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```
R":STOP
80 EXEC X:END
90 DATA 206,66,178,223,244,189
100 DATA 231,255,189,239,76,255
110 DATA 66,108,189,234,47,189
120 DATA 239,76,8,255,66,113
130 DATA 189,234,47,189,239,76
140 DATA 255,66,106,189,234,47
150 DATA 134,2,183,66,103,189
160 DATA 252,139,254,66,108
170 DATA 189,252,96,189,226,113
```

Listing 2 (MC-10):

```
5 REM FIRST,LAST,START,"FILENAME
"
10 CLS:A$="12345678901234567890
12345678901234567890123456789012
3
"
20 B=VARPTR(A$):IFPEEK(B)<>53THE
NSTOP
30 X=256*PEEK(B+2)+PEEK(B+3)
40 FOR Z=X TO X+52
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW<>8373 THENPRINT"DATA ERRO
R":STOP
80 EXEC X:END
90 DATA 206,66,178,223,244,189
100 DATA 231,255,189,239,76,255
110 DATA 66,108,189,234,47,189
120 DATA 239,76,8,255,66,113
130 DATA 189,234,47,189,239,76
140 DATA 255,66,106,189,234,47
150 DATA 134,2,183,66,103,189
160 DATA 252,139,254,66,108
170 DATA 189,252,96,189,226,113
```

Listing 3 (MC-10):

```
10 CLS:A$="1234567890123"
20 B=VARPTR(A$):IFPEEK(B)<>13THE
NSTOP
30 M=PEEK(B+2):L=PEEK(B+3)
40 X=256*M+L
50 FOR Z=X TO X+12
60 READ Y:W=W+Y:PRINTZ,Y;W
70 POKE Z,Y:NEXT
80 IF W<>2375 THENPRINT"DATA ERR
OR":STOP
90 POKE 16918,M:POKE 16919,L
100 INPUT"ENTER A NUMBER BETWEEN
 -30000   AND 30000. ";N
110 PRINTUSR(N)
120 GOTO100
130 DATA 189,235,202
140 DATA 5
150 DATA 189,236,227
160 DATA 189,242,213
170 DATA 126,245,77
```

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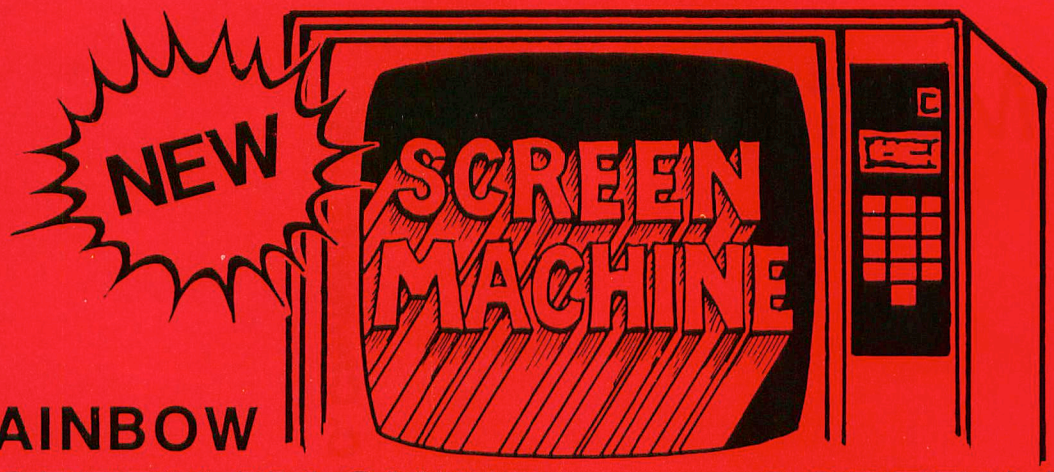

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OS-9 Meets The Wolfbug Monitor

By William C. Clements, Jr.

The Wolfbug monitor program, sold by Atomic City Electronics, is a handy machine language utility for the 64K CoCo owner. It furnishes memory, examine/change, ASCII dump, and other functions common to most monitors, and also has commands for switching into the 64K RAM mode and for transfer of BASIC into RAM. The monitor is supplied in a 2716 EPROM that's used in a special circuit board which plugs into one of the BASIC ROM sockets. The EPROM resides in memory space between $F800 and $FFFF, with the chip-select provided by on-board gates connected directly to CoCo's address lines. A "decode defeat" signal disables the 74LS139 decoder in the computer so that addresses inside the $F800-$FFFF, that address range is therefore effectively removed from control of the SAM chip.

When the computer is used in the 32K RAM-32K ROM mode, there's no problem, because the addresses that Wolfbug occupies aren't otherwise used. However, in the 64K RAM mode, the overriding of the SAM's control means that you lose the use of the RAM between $F800 and $FFFF. Unfortunately, that's where the kernel program of the new Radio Shack version of OS-9 resides, so attempts to boot OS-9 will crash a Wolfbug-equipped computer.

What's needed is a way to switch Wolfbug in and out of the memory map, so that it can be turned off easily before booting OS-9. Fortunately, that is easy to provide. A single pole, double-

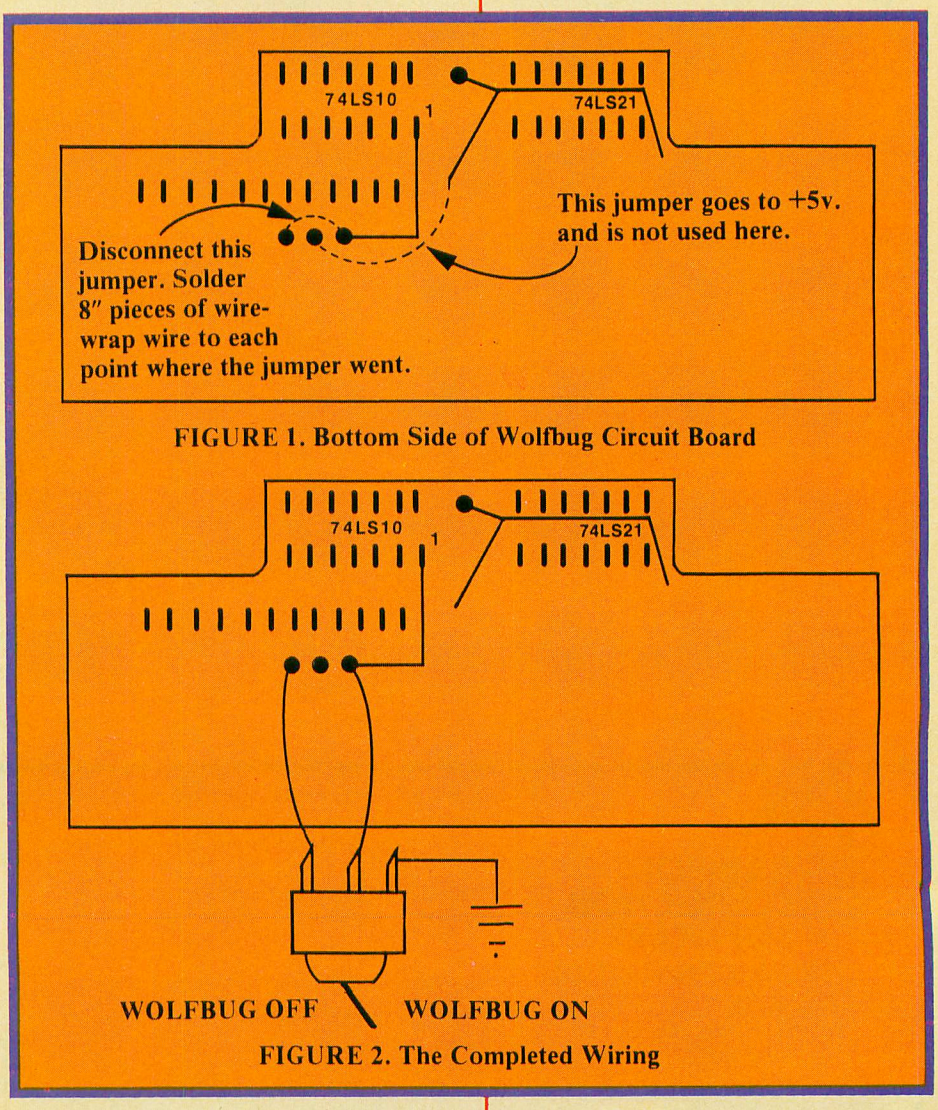


FIGURE 1. Bottom Side of Wolfbug Circuit Board

FIGURE 2. The Completed Wiring

throw switch will let you choose between Wolfbug and OS-9.

The circuit diagram supplied with the Wolfbug kit shows that there are several places to interrupt the address decoding. The circuit board is provided with wire jumpers that allow the selection of either a 2K (2716) or a 4K (2532) EPROM. It is supplied from the manufacturer configured for 2K, but the jumpers are available if one wants to change the circuit. Probably the easiest way to disable Wolfbug is to remove the jumper connected to pin 1 of the 74SL10 and switch pin 1 to ground. That chip contains 3-input NAND gates, one of whose output forms the EPROM chip-select signal. Grounding any NAND gate's input freeezes the output in the "high" state regardless of the condition of its other inputs. Pin 1 is switched back to its original connection to restore Wolfbug to the memory space.

"What's needed is a way to switch Wolfbug in and out of the memory map, so that it can be turned off easily before booting OS-9. Fortunately, that is easy to provide."

To do it, refer to Figures 1 and 2, and follow the steps given below. Incidentally, on the circuit diagram included with my unit, the connections to pins 1 and 2 of the 74LS10 were reversed from the ones actually on the circuit board. The instructions given below are consistent with the actual circuit. Both pins 1 and 2 are inputs to the gate that generates the EPROM select signal, however, so it wouldn't make any difference which one you switch to ground.

1) Remove the computer's cover and set it aside.

2) For computers having the "E" revision circuit board or earlier, the Wolfbug board is located under the RF shield. If that is the case in your machine, gently pry off the RF shield. Carefully pull the Wolfbug circuit board straight up and out of its socket. Turn the board upside down, being careful not to damage the wires attached to it.

(Dr. Bill Clements, a professor of chemical engineering at the University of Alabama, designs peripherals and programs for his department's student computer facility [all CoCos]. His major interests are in process control and microcomputer applications.)

3) Locate the short jumper wire that is connected between the outside holes of the three pads below the 74LS10, as shown in Figure 1. Unsolder both ends of the jumper wire and discard it. Solder a piece of wire-wrap wire about 8 inches long into each of the two holes where the original jumper went. Pass the wires under the RF shield (if your Wolfbug hardware is installed there).

4) Identify the wire going to the right-hand hole in Figure 1. That is the wire that connects to pin 1 of the 74LS10. Solder the free end of the wire to the center contact of a miniature single-pole, double-throw toggle switch (such as Radio Shack 275-613). Solder the free end of the other wire to either of the outside switch contacts.

5) Solder another 8" piece of wire to the remaining outside contact of the switch. Solder the free end to a convenient ground point, such as TP3 or TP4 (for "E" boards and earlier), or TP2 or TP8 (for the newest board revision). The final connections should appear as in Figure 2.

If you'd rather not saw on your cover (and remove the label on the channel switch in the process) you can drill a hole for the Wolfbug switch in the top cover at any free spot that the wires will reach, and mount the switch right in the cover. If you do it that way, just be sure not to forget it's there and break off the wires the next time you pull off the cover.

Label the switch function, using a small stick-on label applied to the case next to the switch. Most toggle switches connect the center contact to the outside contact that is opposite the handle. Turn on the computer and see in which position the command EXEC 64000 brings up Wolfbug; label that position "WOLFBUG ON." If the machine crashes, turn if off and label that position of the switch "WOLFBUG OFF."

Now, when you get ready to run OS-9, just check the position of the switch before booting. When you want to use Wolfbug in non OS-9 applications, it'll be available just by reversing the switch.

64K DISK

KISSABLE OS-9

Point, Counterpoint, Terminal Problems And A Technical Potpourri

By Dale L. Puckett
Rainbow Contributing Editor

Tandy's OS-9 for the 64K CoCo hit the shelves in early November. The phone calls and letters, filled with questions and signs of frustration, started coming soon thereafter.

I got my first look at a production copy of OS-9 at a Radio Shack store in Elizabeth City, N.C. I had a few free minutes one evening while in town attending a week-long pollution response course presented by the U.S. Coast Guard Atlantic Strike Team. I was very impressed with Tandy's professional packaging and the quality of the documentation. Yet OS-9 is so complex and powerful that it's going to take everyone some time to learn the ropes. That's the bottom line.

I remember the first month I used OS-9 — I really stumbled around. I had used FLEX for three or four years, but OS-9 was a whole new ball game. I didn't understand what was happening. The error messages didn't make any sense. But in a week or two, things began to clear up and I've never gone back. Soon, I found myself taking the multitasking; the handy "hierarchical directories; the fast random-access files; the type ahead buffer; the "pipes" and the rest of OS-9's friendly environment for granted.

We're going to take a different approach to *KISSable OS-9* this month. We'll answer as many of your questions as possible and try to help you pass through the early part of the learning curve. First, though, I want to clarify my philosophy to my readers and the fine group of programmers and software distributors that are working their tails off to bring professional software to the Color Computer.

(Dale L. Puckett is a freelance writer and programmer who has worked with the Motorola family of miroprocessors since 1976. He just completed his first book, "A Complete Tour Guide to BASIC09," this summer. It is being published by Microware and will be available this fall. He is the author of DynaSpell, Readtest, Esther and Help, which are available from Frank Hogg Laboratories. He serves on the Info World Software Review Board and is a Chief Warrant Officer in the U.S. Coast Guard.)

Michael R. LeVasseur of St. Petersburg, Fla., brought up a point: "Please limit yourself to the properties of this remarkable operating system. Let the software reviewers and Frank Hogg's advertising dollar take up the new software issue."

Counterpoint: Sorry, Mike. I don't agree. It is not enough to let my readers depend on advertising copy to figure out what new OS-9 software products do or how they work. Advertising is designed to do only one thing — get your attention. It is also very one-sided. Only the good points are mentioned. It seldom explains what a product does and almost never tells how it works or what it can really do for you. Unless a reader really knows and understands software, he is making a long leap of faith when he buys most new packages.

Further, I feel the high resolution display described last month is a major product. It makes OS-9 a usable and viable package. Frankly, it should have been a part of OS-9 itself.

Motorola's 6809 microprocessor is the best eight-bit processor on the market. You won't find many programmers or engineers that will argue with that fact. Yet, because of a lack of standardization and cooperation between vendors in the past, it never became a strong force in the personal computing marketplace. With Tandy's selection of OS-9 as the operating system for the Color Computer, we now have a standard and another chance to become a viable force. I intend to help the 6809 make it this time by explaining every major product in enough detail that my readers will know what it is and what it will do for them.

In fact, here's an invitation to all software developers. If you're developing a new product for Color Computer OS-9, drop me a line. Put us in your rumor loop and we'll help you spread the word. When you have the product ready to go, let us try it and we'll do a play-by-play similar to the article on Hi-Res in December. A lot of packages never get off the ground because they're never explained. We'll do our part to solve that problem with *KISSable OS-9*.

Now What?

LeVasseur also noted that another magazine had said that Tandy's OS-9 documentation was well written and easy to understand. Then he added: "Perhaps so, but I would like to do something more interesting than *BUILDing* files, dis-

playing *DIR* and *MAKDIR*. (Why would I want to *MAKDIR* anyway?) A similar comment came from Bob Dooman of Glenview, Ill. "Okay, I have OS-9, and I understand the 'basic' commands. . . . Now what?"

Let's recap a few of the points I made in my first *KISSable OS-9* column. OS-9 is a tool. And as with any tool, you must learn the basics before you achieve productivity. Before a baby walks, it crawls. Another good analogy is the coach that holds blocking and tackling drills for a month before he puts the first play on the chalkboard.

Each utility program in your OS-9 CMDS directory is a tool and most of them work on files. Before you can work on files, they must exist. *BUILD* is nothing more than a handy utility that makes it easy for you to put small files on a disk so you can use them in the future.

These files may take the form of simple text which you will list to your screen later when you need a reminder. Or, they may be "procedure" files that automatically run your CoCo through a series of small programs that together do a big job. In any case, before you can use them, you must get them on the disk. Hence, *BUILD*.

For larger files you will want to use a larger editor to enter your text or procedures. Microware's *EDIT*, which comes on your OS-9 system disk, is an excellent line editor. If you prefer a screen oriented editor, *DynaStar* is excellent.

DIR is also a necessary evil. Granted, you can print the names of your files if you only have one or two on a disk. But, what happens when you have a dozen? And even if you do remember their names, can you remember how you spelled them when you made up the filenames?

Now, let's justify *MAKDIR*. Remember what it was like when you were running Radio Shack's Extended Disk BASIC? Everytime you typed *DIR*, the names went by on the screen like a fast freight. If you had nimble fingers, you could stop the listing with the [SHIFT][@] combination. It never worked for me. Every time I tried it, the listing would stop just after the name I needed scrolled off the top of the screen.

Even FLEX's *CAT* or *DIR* commands could be a problem. FLEX is a great operating system and it has a feature which causes the scrolling to stop each time the screen fills with text. But did you ever do a *CAT* on an eight-inch disk with 500 files? There must be at least 50 filenames that start with every letter in the alphabet on every one of my drives. It takes a lot of time to look at them all, just to find the command or text file you want.

Enter OS-9's "hierarchical" file structure. Let's use another analogy. How is your office set up? In most businesses, each person has a desk and an individual file cabinet. That cabinet is divided into drawers which contain information relevant to a specific part of that person's job.

Now, let's automate the office. We'll use a microcomputer with an operating system that lets several people work on different terminals at the same time. That sounds like OS-9.

If we were using an operating system like Disk Extended BASIC, everyone's files would be in the same directory — the same file cabinet so to speak. If a secretary needed to find a file for her boss, she would have to look through every file on the hard disk. It would be like looking through every drawer in a large file cabinet. It would take her a long time. The boss would get angry.

OS-9 solves this problem by letting you use multiple directories. Let's go back to the same office and show that the same hard disk would look like if it were running under OS-9.

For starters, it would have a device name, probably "/H0." When the secretary does a *DIR* of the drive it probably looks something like this:

```
DIRECTORY OF 12:32:30
OS9Boot     CMDS        SYS         DEFS
Startup     Read.This   BOSS        SECRETARY
SAM         JOE         SALLY       JANE
```

If she did a *DIR* with the "e" option she would notice that each of the filenames above that were printed on the screen with all capital letters had a "d" printed in the Attributes column. This means it is a directory. Typing directory names in all capital letters is one habit you'll want to pick up early in your OS-9 career. It'll save you from losing your hair with a lot of head scratching.

Now, let's suppose that the file the boss wanted to see was a letter that Sally had sent to the company's ad agency last week. Our trusty secretary could then type:

```
OS9: chd ../SALLY
OS9: dir
```

At this point, she might see something like this:

```
DIRECTORY OF 12:32:45
ADVERTISING NEWSLETTER          PAYROLL
SCHEDULES   ACCOUNTS.PAYABLE
```

Since she knows that each of the filenames listed are directories she then types:

```
OS9: dir advertising
```

She may see something like:

```
DIRECTORY OF advertising 12:33:02

COPY        IDEAS       Agency.Letter
Instructions
```

Now, she can type:

```
OS9: list advertising/Agency.Letter >/p
```

You have just seen how easy it is to find a file when it has been stored in a logical place. Our secretary knew that Sally wrote the letter so she looked in Sally's directory. Since she knew it was to an advertising agency, she looked in Sally's advertising directory. She had the boss' answer in seconds. Looking through hundreds of filenames on a single hard disk directory would have wasted a lot of time. That is why you "would ever want to *MAKDIR*."

Now What, Continued

Now, let's tackle Bob's question. First, we must understand that OS-9 itself is only an operating system. It is not an application package or a language used to write programs. It is, rather, an environment that provides a home for your languages and applications. As we stated in December, it was written to provide the support necessary for BASIC09, a state of the art language designed by Microware and Motorola.

Yet, OS-9 comes with nearly 50 utility programs that can do many jobs for you. With the addition of a toolbox like the one library of file handlers sold by Microware, you can do many jobs right from the OS-9 command line. We gave you a few examples in our January column. Here's another example of what you can do with an understanding of this operating system and a little imagination.

How many times have you wanted a simple database *manager* that would let you look up a phone number fast? Try this:

```
OS9: BUILD phone
? ken kaplan, 515-555-1212, des moines, ia
? lonnie falk, 502-228-4492, prospect, ky
? jim reed, 502-228-4492, prospect, ky ?
```

This sequence of lines uses the *BUILD* utility to place three names with the proper telephone number, city and state, in an OS-9 text file. Of course, you could put hundreds of names and numbers in a file with one of the larger editors.

Now, suppose that you are on the phone and someone asks you for Lonnie's number. Your desk is a foot high in litte yellow telephone slips and someone has taken his card from your card file index. What can you do? If you have a CoCo running OS-9 on your desk and have installed one of the UNIX like toolboxes, you can simply type:

```
OS9: grep Lonnie phone
```

In a second or two this line will appear on your screen:

```
lonnie falk, 502-228-4492, prospect, ky
```

Let's give another example. What can you do if you remember a long lost friend in Kentucky that used to talk to you on the ham radio bands, but you can't remember his name? Try this:

```
OS9: grep ky phone
```

Seconds later you'll see this message on your screen.

```
lonnie falk, 502-228-4492, prospect, ky
jim reed, 502-228-4492, prospect, ky
```

How's that for an easy and cheap electronic phone book?

Terminal Problems

The one problem that has prompted more calls than any other has surfaced when readers have attempted to hook up an external terminal to CoCo's RS-232 connector and use it as device, /T1.

I tried it last August when I first installed OS-9 on my computer and it seemed to work. But, since I was receiving so many calls, I thought I better check it out again. So this weekend, I tried it again, twice.

The first time I used my GIMIX computer running a mode program as a terminal for the CoCo. Talk about overkill. When it didn't seem to be as reliable as I thought necessary, I decided to hook the Televideo Model 925 up directly to CoCo. I wanted to be certain that I did not have a problem with my modem program or with the configuration of the ACIAs on the GIMIX.

After a quick trip to the local Radio Shack for a DB-25 RS-232 connector for the Televideo, I made a cable and tried again. Same results.

At this time, I started to experiment with Baud rates. It turns out that device /T1 in CoCo OS-9 is almost reliable at 600 Baud. If you try to run it at 1200 Baud, it will not work at all. The 300 Baud position seems to be solid, albeit painfully slow.

Unfortunately, it seems that if you want to run an external terminal, you must use a transmission rate no higher than a 300 Baud. Also, I noticed that it is impossible to halt a listing on the external terminal. The wait, interrupt and abort keys simply do not work. All of these problems are caused by the "bit banging" routines that try to make a PIA look like an ACIA to the outside world. Hopefully, the new RS-232 cord that is designed to plug in the new expander interface contains a real ACIA. If so, it will be easy to write a device descriptor and device drivers to use it.

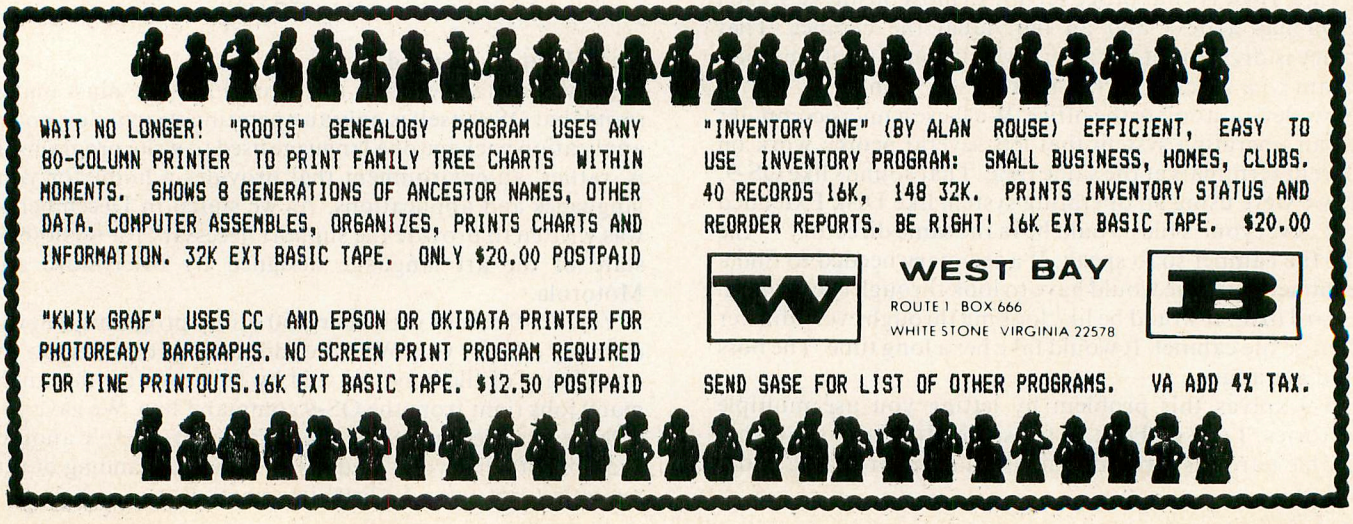
A Higher Stepping Rate Boot

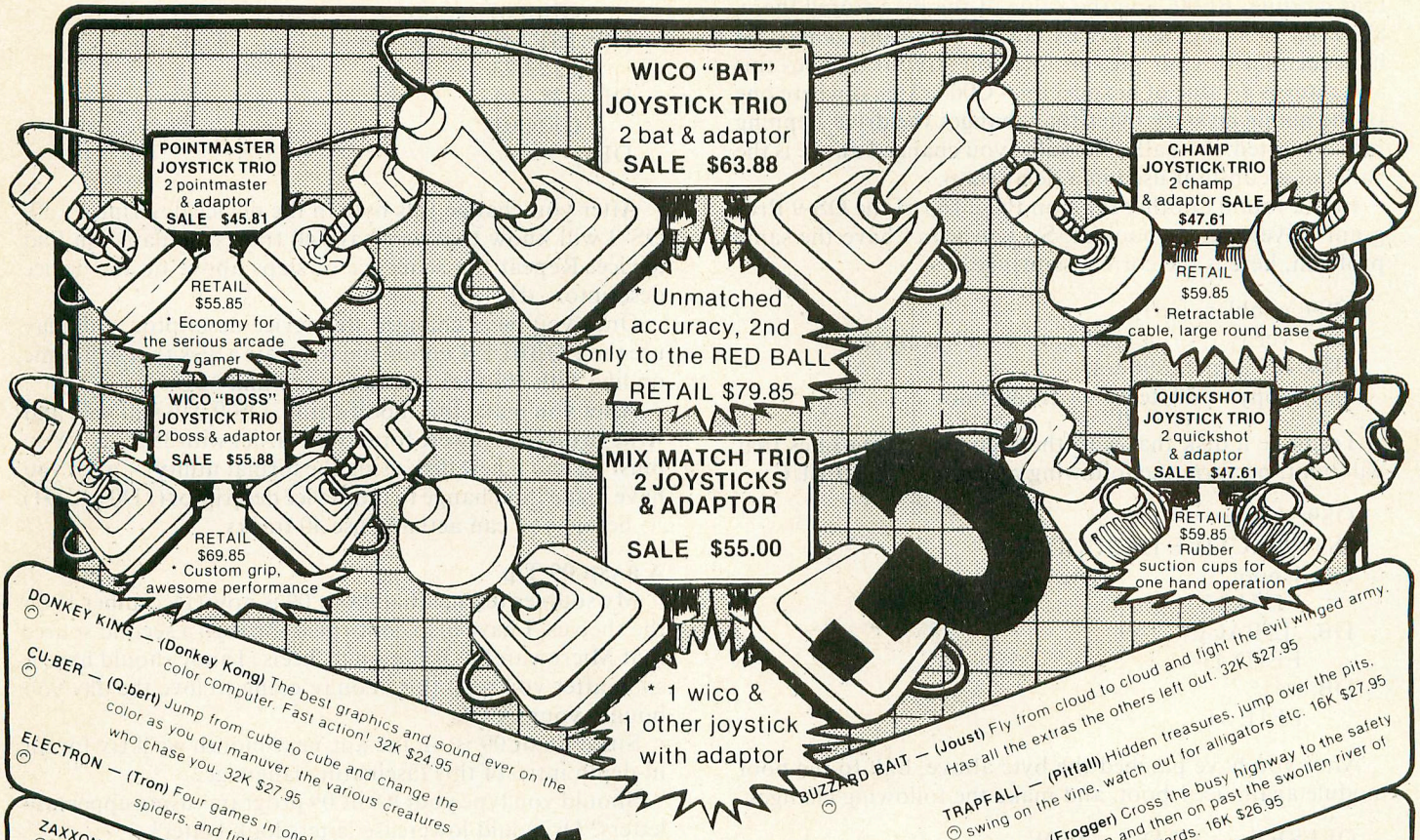
We promised to give you this information last month but somehow it managed to slip through the cracks. Before we start though, we should clear up a related question for J. Frank Fields of Bethany, Okla. The typesetting machine moved two periods too close together and threw him a curve. He writes: "I couldn't follow your directions after DB:L CCDIS. I had to use DB: .BE00+204 or single step to the location, otherwise all was very successful."

Here's what the sequence should look like:

```
OS9: debug
INTERACTIVE DEBUGGER
DB: l ccdisk
     BE00 87
DB: . [SPACE] .+204
     C004 22
DB: =08
     C005 2E
DB: =8B
     C006 30
DB:
```

The "l ccdisk" tells DEBUG that you want it to link to





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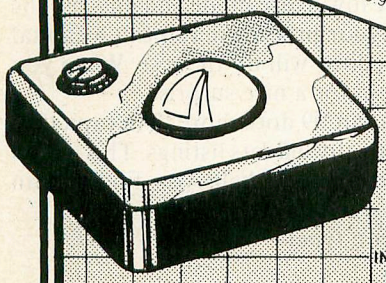

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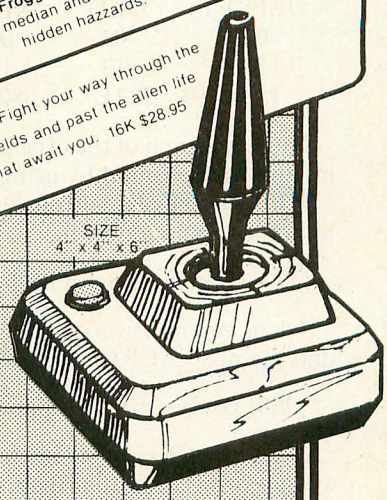

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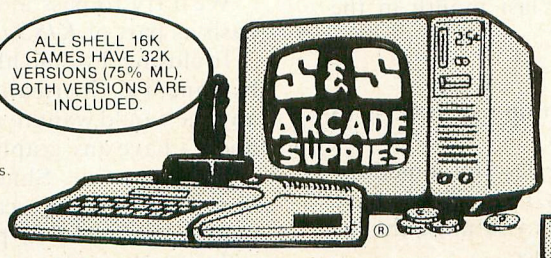

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that module, BE00, and the value of the byte stored there, 87. Your next line tells DEBUG that you want to add 204 hexadecimal to your present location (BE00). It does this and returns a value of hexadecimal C004. This is where one of the magic mystery bytes that changes the drive stepping rate is located. Actually, the value you changed above is the value of a constant used in a delay loop.

Frank found another typo on Page 163 of the OS-9 Program Development booklet. So you won't have the same problem, here is the correct sequence:

```
OS9: cobbler  /d1
OS9: verify  </da/os9boot  >/d0/temp u
OS9: del  /d1/os9boot
OS9: copy  /d0/temp  /d1/os9boot
```

To make a disk that with the higher stepping rates that will boot, perform the following patches using DEBUG:

```
OS9: debug
INTERACTIVE DEBUGGGER
DB: 1 boot
    FD74 87
DB: . [SPACE] .+A9
    FE1D 43
DB: =41
    FE1E 34
```

After you have patched the byte above, link to the boot module again, ie, 1 boot, and make the following changes:

OFFSET	OLD	NEW
B5	03	01
154	13	11
15A-15B	222E	082B

Note that each of the offsets above is from the start of the module and is found by using DEBUG's "1" command.

After you have made the changes you must save the new boot module to a disk file:

```
OS9: save /d1/tempboot boot
```

Then, you must verify the disk file you have just saved to find the proper CRC for the file:

```
OS9: verify</d1/tempboot>/d1/updated.tempboot u
```

Now, the CRC bytes in the file /d1/updated.tempboot will be correct. Examine them with *IDENT* or use DUMP to list them to the screen and write them down. Then, use DEBUG to change the CRC bytes in the "boot" module that you changed in memory. The CRC bytes in memory MUST agree with the CRC bytes in the verified file, "updated.-tempboot." The CRC bytes are the last three bytes in the module. After you make this modification, you can use COBBLER or OS9GEN to make a new boot disk. Don't forget to save the changes you made last month in the CCDIS module.

Faster Speeds And 40 Tracks, Too!

J. Frank Fields also asked how to set up CoCo OS-9 to use his 40-track drives.

This modification is made in the device descriptor module. /D0 and /D1 are both device descriptors. Hence, if you have 40-track drives installed as both devices you must change both drive descriptors. Here's the sequence:

```
OS9: debug
DB: 1 d0
    C10B 87
DB: .[SPACE] .+18
    C123 23
DB: =28
    C124 01
DB:q
```

After you change this byte in the device descriptor /d0, OS-9 will know that you have 40 tracks available on that device. Repeat the sequence of steps above on the device descriptor /d1.

Once you have changed the device descriptor, you may use the COBBLER command to create a disk that will come on line with 40-track drives for /d0 and /d1.

After you make this modificaton, OS-9 *will still read and* write to disks that were formatted earlier with 35 tracks. You must format a new disk using the format utility — after you have made this change to the device descriptor (/D0 or /D1) — before you can actually use 40 tracks.

A BASIC09 Tip

My sources tell me that BASIC09 is now (December 1) on the shelves. I have also confirmed through a second source that Microware's C is hot on its heels. Tandy should have it soon after you read this. You're going to love the day you bought your CoCo.

Since BASIC09 is on the air, next month we'll try for an in-depth intro of this fascinating language.

Should you type your BASIC09 programs using uppercase letters? Or would lowercase letters look better?

Most programmers will agree that BASIC programs look nicer and are easier to understand when BASIC keywords are typed in uppercase letters and variable names are typed with lowercase letters. With many languages, this is quite a hassle. It's a snap with BASIC09.

Here's how to go about it. When you type a procedure, leave your keyboard in the lowercase mode and only use the shift key when you want your procedure to print a capital letter. BASIC09's built-in editor will do the rest. When you list the program you'll be in for a nice surprise.

In fact, you'll see that BASIC09 does more than capitalize keywords. It also automatically indents listings. This makes procedures easier to read and will help you find certain logical errors.

Here's an example. If you type:

```
for count := first to last
print count
```

BASIC09 will list it like this:

```
FOR count := first TO last
  PRINT count
NEXT count
```

We'll try to pass along little hints like this on a regular basis as part of *KISSable OS-9*.

In closing, I would like to correct a false impression stated by Shneor Z. Sherman of Davis, Calif. He wrote to ask why anyone would want to run OS-9 and BASIC09 since BASIC09 doesn't have any graphics capability.

Far from true, Shneor. With OS-9, even the operating system has graphics capabilities. It would be a very easy matter to *BUILD* a procedure file using the *DISPLAY* utility and produce all kinds of attractive graphics on CoCo's screen. Maybe we'll try that next month! Till then!

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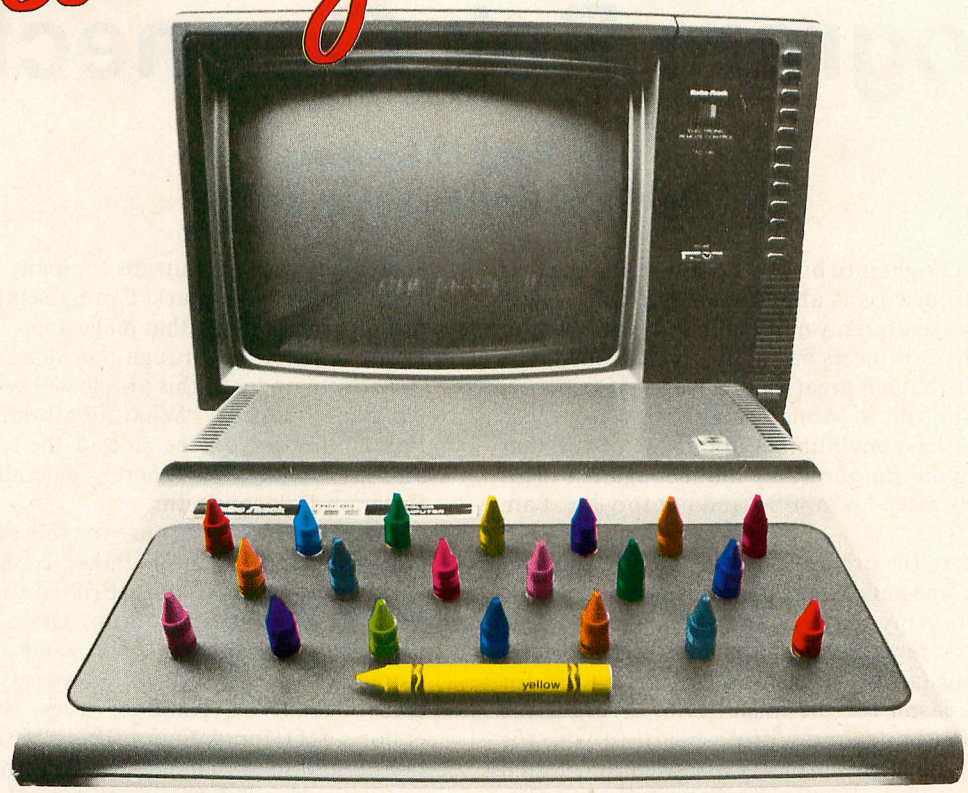

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HOT CoCo

Trouble Shooter Makes Program Pak Connection

By Tony DiStefano
***Rainbow* Contributing Editor**

I would like to get right into business this month. The first thing I want to discuss is about telephone calls. I was good enough to give out my number to those people who had problems with my projects or want to express an idea or opinion and I think that it is great that I got a lot of response; but please limit your calls to Monday nights only! For those of you who do not have my number and those of you that just started getting *the Rainbow*, my number again is (514) 473-4910. Call only after 7 p.m. EST and not too late. I am an early riser!

Okay, now back to the order of the day (month?). One of the best things to come out of these phone calls is that people can point out errors in my articles. (Yes, I do make mistakes. You should see my replacement-parts bills.) The faster I know about the mistakes, the faster I can write a fix for them. The main reason for the mistakes or errors is the transfer of information from my proto-board to you, *the Rainbow* reader. All of my projects are tried and tested before I write them in here. If a project that you put together does not work, check your work carefully. If it still doesn't work, call me and I'll give you a fix. If I can't give you a fix on the spot, I'll write one up in the following article. Speaking about fixes, here is one.

There is a problem with my internal speaker/amplifier project. The capacitor marked C-2 in the parts list is wrong. It is not a .022 uf capacitor. It should be a .002 uf capacitor. Also, the part number for the LM-380 (IC-1) is not 276-076 like it says in the article, but 276-706. Sometimes my fingers get carried away. The last thing to mention is a misprint in Figure 1. The little scribble to the right of C-2 should read "6." That is pin #6 of the IC. I would like to thank Hilton Wasserman for pointing this out to me. For your interest, the schematics in "Turn of the Screw" are drawn with the help of my Color Computer and an EPSON printer. I use the program *Schematic Drafting Processor*, currently being distributed by Spectrum Projects. See the ad in this magazine.

I received a letter from Kyle Rogers this month, this is a part of it; ". . . I enjoy reading 'Turn of the Screw,' and I would like to build many, if not all, of the projects presented. But I find that I have neither the tools, skills, nor the time to construct the devices. Many hardware columns in other magazines have alleviated this problem by making an agreement with an outside company for that company to manufacture and market pre-assembled versions of the projects presented in that magazine. . . ." Can anyone help? Please contact me through *the Rainbow*.

The remainder of this article will be in answer to Tewfick Chidiac's question, "What do all the pins in the Program Pak connector, on the side of the computer, connect to, anyway?" Okay, Tewf, here is a detailed description of the Program Pak connector.

First of all, the main use for this connector is to plug in (you guessed it), Program Paks. These are little plastic cases that contain a small PCB (Printed Circuit Board). On this PCB these is usually one or more ROMs (Read Only Memory). This is where the game or utility software is stored. Other examples of different types of Paks are; disk controllers, RAM (Random Access Memory) boards, printer ports, I/O (Input/Output) boards, serial communications boards and so on. They all have one thing in common. They access the "bus." A bus is a term used to represent common wiring that connect to many components. Having access to the bus lets you expand the capabilities of your computer. The bus in the Color Computer fall into three main categories; data lines, address lines and control lines. Our computer has eight data lines, it is known as an 8-bit data bus. It also has 16 address lines and several control lines. The following is a list of all the lines (or pins) that come out of the connector.

Color Computer Bus Descriptions

PIN#	Function	Description	Direction
1	-12v	-12 Volts	Output
2	+12v	+12 Volts	Output
3	$\overline{\text{HALT}}$	Halt line to CPU	Input
4	$\overline{\text{NMI}}$	Non Maskable Interrupt	Input
5	$\overline{\text{RESET}}$	Resets the computer	Input
6	E	Main clock signal	Output
7	Q	Secondary clock signal	Ouptu
8	$\overline{\text{CART}}$	Cartridge detect signal	Input
9	+5v	+5 Volts	Output
10	D0	CPU Data line #0	I/O
11	D1	CPU Data line #1	I/O
12	D2	CPU Data line #2	I/O
13	D3	CPU Data line #3	I/O
14	D4	CPU Data line #4	I/O
15	D5	CPU Data line #5	I/O
16	D6	CPU Data line #6	I/O
17	D7	CPU Data line #7	I/O

(Tony DiStefano is well known as an early specialist in Color Computer hardware projects. He is one of the acknowledged experts on the "insides" of CoCo.)

18	$\overline{R/W}$	Read/Write signal	Output
19	A0	CPU Address line #0	Output
20	A1	CPU Address line #1	Output
21	A2	CPU Address line #2	Output
22	A3	CPU Address line #3	Output
23	A4	CPU Address line #4	Output
24	A5	CPU Address line #5	Output
25	A6	CPU Address line #6	Output
26	A7	CPU Address line #7	Output
27	A8	CPU Address line #8	Output
28	A9	CPU Address line #9	Output
29	A10	CPU Address line #10	Output
30	A11	CPU Address line #11	Output
31	A12	CPU Address line #12	Output
32	$\overline{CTS}$	Cartridge Select signal	Input
33	GND	Ground Return	Input
34	GND	Ground Return	Input
35	SND	Sound Input	Input
36	$\overline{SCS}$	Spare Select signal	Output
37	A13	CPU Address line #13	Output
38	A14	CPU Address line #14	Output
39	A15	CPU Address line #15	Output
40	SLENB	Device Disable	Input

I shall describe each pin in detail and where it connects to inside the computer. 1) This output pin comes from the power supply. It supplies -12 Volts to any component, maximum drain is 100 ma (miliamps). 2) This output pin also comes from the power supply. It supplies +12 Volts and has a maximum of 300 ma. 3) The Halt line is an input line that goes directly to the CPU. It is tied to normally HI (+5v), by a resistor of 4.7k ohms. When this pin goes low, the CPU completes its last instruction and goes into the tri-state mode. Tri-state means that all of the CPU bus lines are high impedance, They are neither HI nor LOW. It is as if nothing was connected to it. 4) The NMI input line goes directly to the CPU. It is also tied HI. When this line goes low, the CPU performs a non-maskable interrupt. That means that the CPU will jump to a predetermined address and continue to execute this code until it reaches an RTI (Return from Interrupt), in which case it will continue doing what it was doing before the NMI line went low. 5) The RESET line connects to the CPU and all the man chips that have reset lines. All except the VDG chip. That is only controlled by the external [RESET] switch in the back of the computer. The function of the RESET line is to initialize all the components to powerup conditions. Under software control, if the value in byte # $71 (113) is not equal to $55 ($ denotes Hex), the computer will do a cold start. If it is, it will attempt to do a arm start. This line is also tied HI, but ith a 100k ohm resistor. 6) The E clock is the main timing for the CPU. The E clock is generated by the SAM (Synchronous Address Multiplexer) and goes into the CPU and nto the bus. 7) The Q clock is the secondary clock. It is also generated by the SAM. The Q clock leads the E clock by 90 degrees. 8) This input goes into one of the PIAs (Peripheral Interface Adapter). It is tied HI with a 10k ohm resistor. The function of this line is to detect the presence of a Program-Pak and to jump to it. 9) This output pin comes from the power supply. It supplies +5 volts to any component with a maximum of 300ma. 10-17) These eight DATA pins provide bi-directional communications between the CPU and the system. They connect directy to the CPU and all other data related chips. 18) The Read/Write line is an output which tells all data related chips which direction the data lines of the CPU are in. 19-31 and 37-39) These 16 pins address lines come from the CPU and tell all other data related chips, where in memory the CPU wants to Read ot Write. 32) This output is a chip select. It comes from pin #12 of the 74LS138. It is memory mapped to select memory between $C000 (49152) and $FEFF (65279). This is a 16K block of memory known as the cartridge memory or the Color Disk BASIC ROM area if you have a disk drive plugged in. The pin is active LOW, which mans that the meory chips associated with this pin will respond when it is low. 33-34) These two pins are ground returns. All signals are returned to the system through them. 35) This input is connected directy to the sound multiplexor (MC14529b) pin #12. With this pin, sounds in the audio range can be output to the TV speaker. 36) This output is another chip select. It comes from pin #9 of the 75LS138. It is memory mapped to select memory between $FF40 (65344) and $FF5F (65375). This is a 32 byte long block of memory mainly used for external I/O for such devices as a disk controller or PIAs. The pin is active LOW, which means that the I/O devices associated with this pin will respond when it is low. 40) This input is connected to pin 6 of the 74LS138. This active LOW pin disables the internal device selection. This allows decoded but unused sections of memory to be used by the cartridge hardware.

Now that you know all about the cartridge connector, go out and experiment but be careful, CPUs and SAMs are quite expensive.

References:

Radio Shack Color Computer Technical Reference Manual
Motorola Microprocessors Data Manual.
Artwick Microcomputer Interfacing

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THE ADVANCED OPERATOR

For The CPU Of Choice: Go CoCo

By Frank Hogg

This is the first installment of a column by the head of Frank Hogg Laboratory on advanced operating systems, including FLEX, OS-9 and matters of your choice. You may mail requests for topics to The Advanced Operator, Frank Hogg Laboratory, The Regency Tower, Suite 215, 770 James St., Syracuse, N.Y. 13203

What is an *Advanced Operating System*? Before I get into what an advanced operating system is, I have to give you some history so that you have a point of reference. Hang on,this won't be *that* boring. I first became involved with micros in early 1977. My first computer was called a "KIM 1." It had all of 1K of RAM and a 2K ROM monitor. It cost more than the 16K CoCo costs now. The only "mass" storage was a slow 300 Baud cassette — the CoCo is 1200 Baud — and the display was a six segment LED display.

After about six months I was able to get a deal on a TTY and move up in the world. Now, I not only had a terminal with real keys, I also had hard copy output. It ran at a fearsome speed of 110 Baud, that's 10 characters per second, or about as fast as you can type. Pretty bad, but remember that was 1977. The KIM had a 6502, just like the Apple and Commodore, but there was no software available for it and I became restless for something more.

I picked up a used SWTPC 6800 computer. This was originally a kit, and the company is still in business today. As a matter of fact, I think it is the oldest microcomputer company still in business. The SWTPC is a SS50 bus computer, you probably have seen the ads for GIMIX, a well known SS50 manufacturer. Well, this is what I had as my second computer. It didn't have an operating system because it didn't have a disk, but luckily after three or four months I was able to scrape together the thousand dollars I needed for a five inch disk system. This system had two five-inch *single*-sided *single* density drives with 340 sectors of storage each! It doesn't seem like much now, but remember, back then things were much different. Besides, we didn't have much to put on the disks anyway!

We finally get to an operating system. The SWTPC had what can only be called a primitive operating system. It did little more than save and retrieve information from the disk. It was not even as sophisticated as RS DOS. You had to think of the disk as a tape and take care of most of the details yourself. This meant that you, as the programmer, were responsible for all the things that todays advanced operating systems take care of for you. When you think about it for a while, you can come to the conclusion that after all, this *is* a computer and the software in *it should do the work, not you.*

Pretend that you had a computer that you could say the following to:

"Computer, when is my next appointment?"

and the computer would respond. Well, we haven't reached that stage yet, but advanced operating systems try to lessen the need for you to have to deal with your computer at a low level. The more sophisticated an operating system is, the better job it will do. There are problems with this though; the main one being that operating systems are developed before applications can be developed to run with them. The same is true for the hardware they run on. The evolution is this: first, the computer is created, then the operating system, and finally the applications software. By the time a sufficient amount of software becomes available for a particular computer, the computer itself is obsolete. This is the case for the Apple. It has a lot of software available for it, but the design dates back seven years — to the dark ages.

Of all the 8-bit processors on the market today the 6809 is the most recent state of the art. It is at year three or so in its development, and the amount of software available for it has reached a volume where it is now a practical CPU to work with. The fact that it is the best 8-bit CPU, and better than most 16-bit CPUs, doesn't hurt any either. The 6809 is the CPU of choice to buy today. It just happens to be the one in the CoCo, GIMIX and several other state of the art computers available today.

The world is full of "Band wagon followers." If you read anything today about computers you will undoubtedly come away with the feeling that if you don't own an IBM or a "compatible" computer, then you are not with it. People are buying on image, not performance in that area, or they are buying VIC-20s because of price rather than performance. Here are some facts for you to digest. The CoCo running FLEX and TSC Xbasic is three, that's *three*, times FASTER than an IBM PC! These timings are from a benchmark that appeared in *Interface Age* about one and a half years ago. The CoCo is not only the fastest micro around, but the quality of operating system software, both in FLEX and OS-9, is *far* superior to anything available for any other 8-bit system.

Think of this for a moment. What computer under $3,000 is multiuser and/or multitasking? I can't think of any, but do you know that for under $1,000, the CoCo with OS-9 *is*! Let me digress for a moment and talk about the importance OS-9 has on education.

Every college of any value has computers that run with UNIX! This means that every student that is going to attend college will have an advantage if they are familiar with UNIX before they begin college. OS-9 is based on the UNIX concept, and the transition from one to the other is very easy. OS-9 is very similar to UNIX, and therefore is ideal for students to work with. As a matter of fact, we are going to market a series of programs based on UNIX utilities to futher enhance OS-9 as a UNIX like system.

(Frank Hogg is the president of Frank Hogg Laboratory, one of the world's largest suppliers of software for 6809 based computers. He and his wife, Linda, live in Syracuse, New York.)

THE TANDY SCOREBOARD

When Tandy first came out with the CoCo there were several deficiencies that needed improvement. Some of them have been taken care of and some remain to be fixed. Here is the list to date:

1. Not enough memory. Stage 1
2. Poor keyboard.
3. Poor asthetics. (Gray case)
4. Insufficient display (16 x 32)
5. Not enough online disk storage.
6.. Not enough memory. Stage 2

The display has always been a problem. You simply cannot do much with only 16 x 32. Software packages like O-Pak for OS-9 and several big screen packages enhance the display, but at the cost of memory. What is really needed is a built in display that handles at least 24 x 80.

The RS disk system is only single-sided. This limitation becomes evident with the use of OS-9. The system disk as purchased from Tandy has only 112 sectors free from the 630 that are available on the disk. Although you can up the tracks to 40 if your drives can handle it, a double sided capability is needed, like FLEX and even better, a hard disk system.

When Tandy came out with the 64K CoCo, they took care of the first memory problem. However, OS-9 uses so much memory (capable of using up to one megabyte) that Tandy now needs to add even more memory to make the system truly useful.

Do not dispair. Tandy does listen to its customers; the fact that they have upgraded the system so far is indicative of that. So be patient, I am sure that things will improve.

MORE ROOM

Because the RS OS-9 disk has so much stuff on it there is little left for your own files. Well, there is a way to free up a considerable amount of room. First, you have to determine what your needs are. You probably don't use timesharing so you can remove the files from the /cmds directory that are needed for that. They are *tsmon* and *login*. Other commands that are not used often are *binex*, *cobbler*, *dcheck*, *exbin*, *sleep*, and *tee*. Of course you may have different choices, but you get the idea. For doing assembly work you should make up a separate disk with the appropriate commands and remove them from the system disk. On the disk that is not used for assembly work you do not need the /DEFS directory. If you do not log on your system, and there is no reason to, you do not need the /SYS directory. Basically, you have to make up several "system" disks for each specific task you want to perform.

On the memory side of things, you can free up a few pages by OS9gen'ing a new boot and leave off the modules *pipeman*, *piper* and *pipe*. If you do not timeshare, then you don't need the modules *T1* and *RS232*. Finally, you only need the descriptors for the drives that you have: ie, *d0* and *d1*. This will only save a few pages, but you may need the memory. After all, once you've done it you do not need to do it again.

In order to make this column useful to you, I need input from you, in the form of questions and suggestions, as to what I should cover here. Please send them in care of the magazine.

Coming next month . . . I don't know! So, send in your questions, or you'll be in for as big a surprise as me.

Till then . . .

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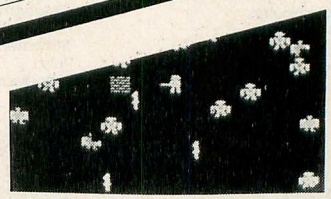

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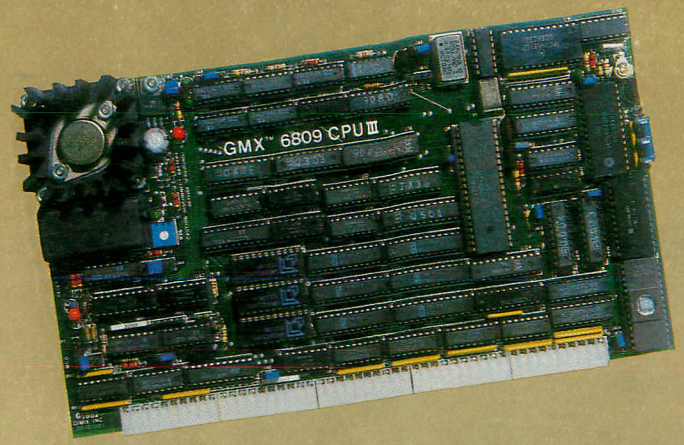

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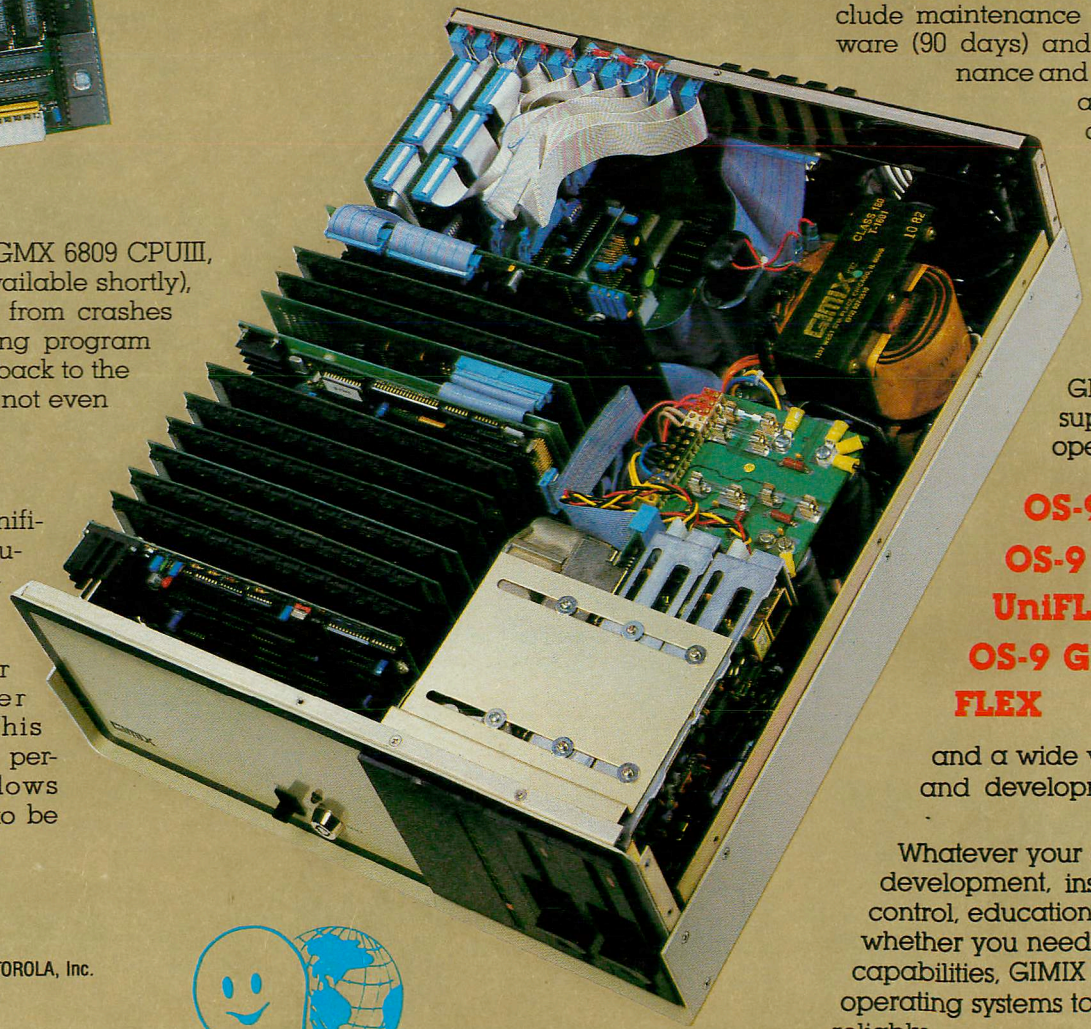

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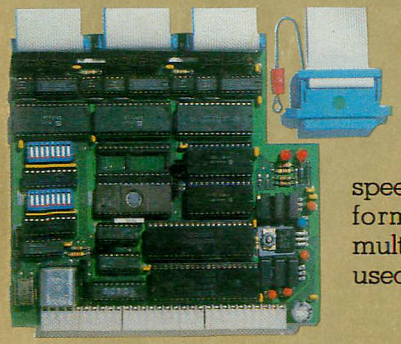

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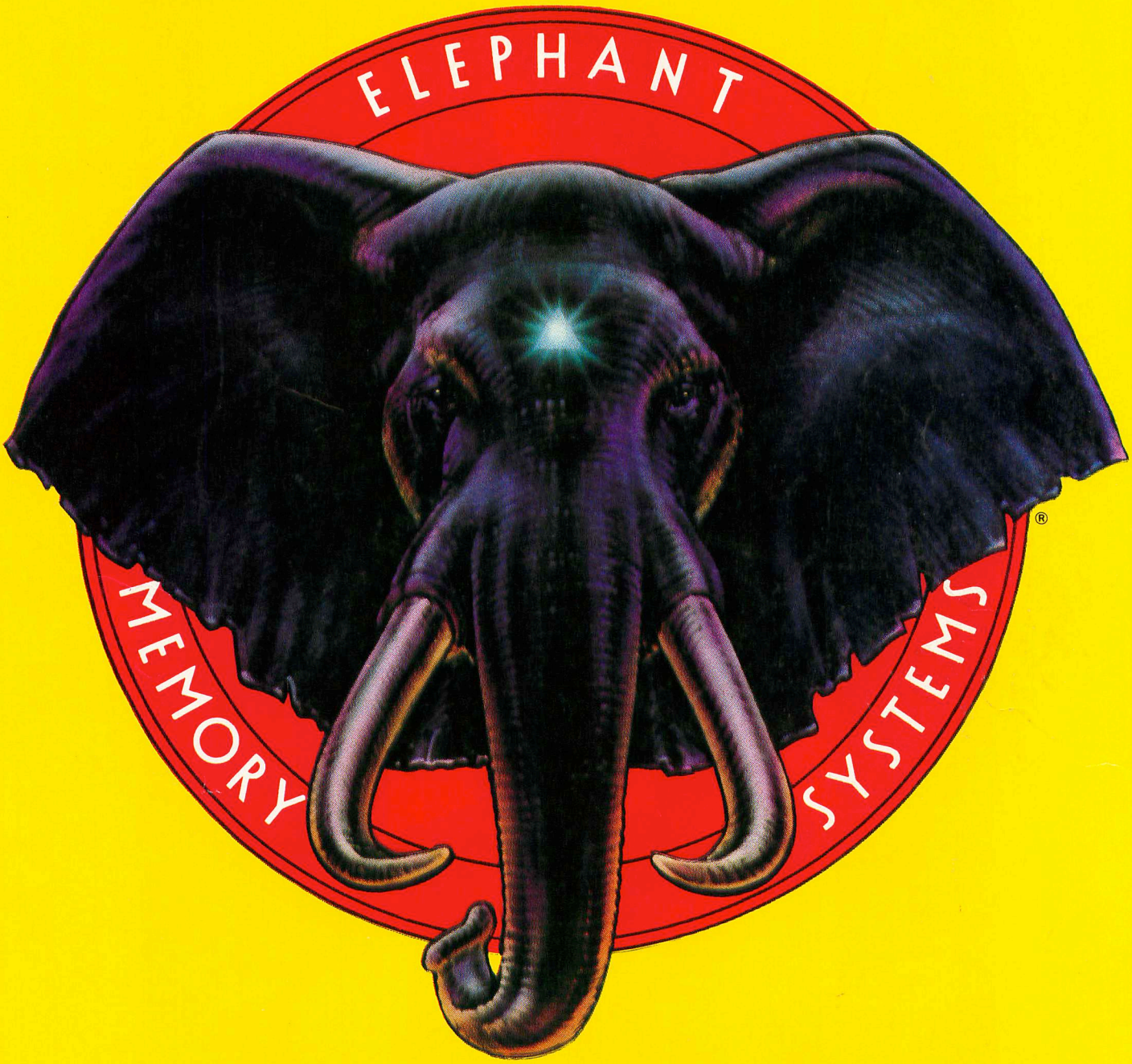

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